Exploring the Link Between Player Involvement and Learning Within Seventh Generation Video Games

Thesis

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Exploring the link between player involvement and learning within seventh generation video games

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Abstract

Digital games are becoming increasingly popular with the latest generation of consoles introducing games to an even wider audience. Academic interest in the educational potential of video games is also growing and seems to stem from the fact that they are considered motivating. However, while there is some research on what makes games engaging, there is still a need to further our understanding of the link between player involvement and learning. This project aims to explore the informal learning that occurs within games, to identify the experience of player involvement, and to investigate the relationship between the two. The Digital Game Experience Model (DGEM), with its metaphor of incorporation (Calleja, 2007), is introduced as a framework that can help address these issues and to provide researchers in the area with a common terminology. A case study methodology was adopted, while the method itself consisted of an observation of game-play and a post-play cued interview in which a recording of the game-play was reviewed. A summarised version of each case-study, with an example of a critical instance or theme, is presented in order to illustrate how the DGEM was used to address the research questions. The findings indicate a very close relationship between the learning that occurs within the game and the involvement experienced by the player, suggesting that a certain amount of learning is required before the player can experience deeper levels of involvement. However, further research is needed before any conclusive claims can be made and to establish whether the metaphor of incorporation applies to all types of games.

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Chapter 1: Aims and objectives

1.1 Introduction

"For my generation, videogames are just part of the cultural furniture"

Poole (2001; p. 2).

Computer and video games have become a significant part of our cultural experience, with the recent introduction of the latest generation of gaming consoles (e.g. Nintendo's Wii), bringing digital games to an even wider audience (Ward, 2008). At the same time, academic interest in the use and analysis of games has continued to grow, as illustrated by the emergence of the multi-disciplinary field of Games Studies (Calleja, 2007). This popularity and interest has led some researchers, e.g. Kirriemuir and McFarlane (2002), to ask how we can "harness the motivational power of games" to make learning more fun (p. 4). Games can also be seen as examples of successful informal learning environments (Sefton-Green, 2004) on which people choose to spend their time, energy, and money.

However, despite the interest in what makes digital games engaging, there does not appear to be a consistent way of discussing player involvement across games or a complete understanding of how this process affects learning. In order to address these issues, the remainder of Chapter One will give a brief overview of different types of games and consoles and an introduction into the area of games and learning. Chapter Two seeks to review the research on player involvement and learning in games in order to illustrate how the lack of a common vocabulary in the area has

been problematic. The Digital Game Experience Model (Calleja, 2007), will be presented as a way of providing researchers with a common framework. The chapter will then conclude with the research questions this study seeks to address. Chapter Three will then illustrate the different methodologies used within the area of games and learning. This section will also describe the research design chosen for the project and conclude with a discussion of the relevant ethical issues. Chapter Four discusses how the data was collected and analysed while Chapter Five introduces and discusses each case-study in turn. Finally, Chapter Six relates the findings to the research questions and the literature. This will include a discussion of the limitations of the project and some suggestions for future research.

1.2 Background

Digital games have come a long way since Atari launched Pong in November 1972 (Poole, 2001), in terms of both software and hardware. The latest generation of games (the seventh, according to "History of video games", 2008) probably looks very different to early video games, especially in terms of graphics, which have been continually improving over the years. In addition, consoles such as the Nintendo DS and Wii are changing the way people interact with their consoles through the use of touch screens and motion-sensitive controllers ("History of video games", 2008). While it is plausible that the underlying mechanics are the same, the improvements in graphics and different interaction methods have led to increasingly complex and realistic games, and quite possibly different experiences of engagement.

There are different types of digital games and various ways in which they have been categorised. For instance, on the amazon.co.uk website, consumers can browse

games by looking at specific genres. The genres listed are: action and adventure, driving and racing, puzzle, board and casino games, retro and arcade, role playing games, simulation, sports and strategy. It could be argued that these distinctions have been made with the aim of selling a specific experience to consumers. In contrast, Egenfeldt-Nielsen, Smith and Tosca (2008) propose a taxonomy based on the goals that are set. In this system, action games rely on a combination of hand-to-eye coordination and motor skills e.g. PacMan, Half-Life 2. Adventure games require deep thinking, patience, and logical thinking e.g. Maniac Mansion, Baldur's Gate. Meanwhile, strategy games sit somewhere in-between and usually involve the player working with a number of different variables, and making decisions based on their opponents' behaviour (whether AI-controlled or human) e.g. Warcraft, Civilization. Finally, there are process based games that provide a system to be experimented with e.g. SimCity. Simulations are a sub-genre of this category where the player learns how to master the replication of a realistic interface e.g. Flight Simulator 2002. It should be noted however that games can and often do fall into more than one category. For example, while Baldur's Gate can be classified as a single-player adventure game, it could also be a strategy game (Egenfeldt-Nielsen et al., 2008).

1.3 Digital Games and Learning

With respect to digital games and learning, a distinction is often made between learning within informal or formal contexts. For instance, Seely-Brown (2006) highlights the difference between the learning that occurs when playing a game that has been designed to explicitly teach something, and when playing a game that also aids the development of social, technical and managerial skills, as an "accidental effect" (p. 22). The former is an example of what are increasingly being referred to

as "serious games", which are used within formal educational environments to deliver subject specific learning outcomes (de Freitas and Oliver, 2006), while the latter seems to refer to the informal learning that occurs when games are used for leisure (Sefton-Green, 2004). While Seely-Brown (2006) is referring in particular to the learning that occurs in massively-multiplayer online games (MMOGs) such as *World of Warcraft* (*WoW*), computer games are generally seen as examples of informal learning. For instance, in a review of informal learning with technology outside of school, computer games were included as an example of technology being used in this context (Sefton-Green, 2004). The review notes the prevalence of different forms of technology within UK households, including games consoles, and it explores how people learn, but it seems to have less to say about what is actually learnt within these contexts.

While Seely-Brown (2006) focuses on informal learning in terms of the skills players can apply elsewhere, it can be argued that how the player learns to play a game is also a type of informal learning. In this case, there are no specific learning outcomes to be assessed, while the player's progression through the game can be seen as evidence of successful learning. When studying informal learning in this context what is essentially being examined is how we learn through play, something de Freitas (2006) suggests we do not have a complete understanding of. Similarly, Squire (2002) points out that we do not really know what players are actually learning from digital games while Pelletier and Oliver (2006) suggest that much of the previous research on games and learning has focused on issues such as curriculum integration as opposed to instances of play. It would seem that there is a need for further studies of actual game-play in order to help further our

understanding of not only what players learn within games but how they learn within games.

Chapter 2: Literature Review

This chapter begins with an introduction to the area of games and motivation which raises some questions about the link between engagement and learning in this context. It then continues with a discussion of how the lack of a common vocabulary to describe different forms of player involvement within the area has been problematic. In order to do so, the different ways in which involvement has been conceptualised within the literature will be examined by looking at the use of the terms immersion and presence. An alternative conceptualisation, entitled the Digital Game Experience Model (Calleja, 2007), will be presented as a way of providing researchers with a common framework they can use. It will be argued that the adoption of such a model when talking about games would aid our understanding of the relationship between learning and involvement and so the section concludes with a set of research questions that aim to address these issues.

2.1 Digital games and motivation

One of the most common reasons cited for academic interest in computer games and learning is that they are motivating (Kirriemuir and McFarlane, 2002; Mitchell & Savill-Smith, 2004). These reviews seem to suggest that games are motivating, and therefore engaging, which is good for learning, though this is not explicitly stated nor is it clear how games actually manage to engage. Some of the earliest work in this area was carried out by Malone and colleagues. Malone proposed a theory of "intrinsic motivation", based on experimental manipulations of different versions of the same games, which suggested that games are rewarding in and of themselves because of how they combine the elements of challenge, fantasy, and curiosity (Malone, 1981). Later work added the element of control, and further interpersonal

motivators (recognition, competition and cooperation) in order to account for the influence of social factors on gaming motivation (Malone and Lepper, 1987).

While this research has influenced the design of educational games by emphasising the need to integrate educational content within actual game play, Egenfeldt-Nielsen, Smith and Tosca (2008) argue that despite the addition of interpersonal motivators, the model fails to take the context around the game into sufficient account. The authors suggest instead that the socio-cultural approach (where learning is seen as the result of participating in communities of practice) is becoming more influential amongst those interested in the educational use of video games e.g. Gee (2004).

In addition, it seems the relationship between engagement and video games is taken for granted. Malone (1981) draws upon the earlier literature of learning theorists, including Piaget and Bruner when he states "if students are intrinsically motivated to learn something, they may spend more time and effort learning, feel better about what they learn and use it more in the future" (p. 335) but he also admitted his own study focused on what made computer games fun as opposed to the link between games being fun and them being educational. The implication is that if players are intrinsically motivated to play, they will be engaged and learn more.

However, Prensky (2001) suggests that one of the main challenges for game designers is to keep players engrossed in the game while ensuring they are able to learn how to progress at the same time. de Freitas (2006) echoes this concern, especially in relation to educational games, when she writes "A key challenge for designers then is to get the correct balance between delightful play and fulfilling

specified learning outcomes" (p.5). These statements raise the possibility that engagement, or possibly excessive engagement, might detract from a learning experience. They also highlight the fact that there is some confusion concerning the relationship between these experiences, especially when contrasted with statements such as the following: "Learning in games is defined not so much as an outcome as part of the process of playing, and relates less to the content of the game than to the complexity of its design; according to Gee, learning and playing are simultaneous and largely synonymous processes. The pleasures and frustrations of playing are akin to those of learning" (p. 330; Pelletier & Martin, 2006).

It is worth noting that there are a variety of ways in which researchers talk about player involvement. For instance, in the area of games and learning, the terms motivation and engagement are quite common e.g. Kirriemuir and McFarlane (2002); Mitchell & Savill-Smith (2004). Another term that gets used frequently, in reference to the experience of game playing is immersion. Games are seen as immersive environments (de Freitas, 2006) but Calleja (2007) suggests the term has been used inconsistently since it has been used to describe the experience of deep involvement, and to refer the experience of being represented within a virtual environment.

2.2 Immersion and presence

As part of his research, Calleja (2007) reviewed the use of "immersion" and the use of another term used to describe the player experience, "presence". He concludes that "the metaphor of *immersion as deep absorption* [has become] conflated with a metaphor of *immersion as traversable space habitation*" (p. 94). An example of the

former comes from Brown and Cairns (2004). Based on open-ended interviews with gamers and the application of grounded theory, the authors state that immersion is part of a continuum of involvement, somewhere in between "engagement" and "total immersion", where "total immersion is presence" (p. 1299).

An example of how the terms have become conflated is seen in the interpretations given by Witmer and Singer (1998) with reference to Virtual Environments (VEs). The authors define immersion as "being enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences" (p. 227) and presence as "the subjective experience of being in one place or environment, even when one is physically situated in another" (p. 225). They gave participants "Presence" and "Immersive Tendencies" questionnaires to fill out after completing a task within a VE and concluded that the questionnaires were internally consistent and reliable, while there is a weak relationship between presence and task performance. However, Slater (1999) disputes that they have provided enough evidence for these claims and points out that the authors seem to have confused what he calls "system immersion" (the extent to which the system provides a surrounding environment) with an "immersive response" (how people describe their subjective responses to the system). Slater also suggests that ethnographic studies would be more useful for examining these kinds of concepts.

The confusion surrounding the term "immersion" seems to have carried over into the area of learning and games, though "presence" is not used to the same extent. For instance, de Freitas (2006) uses the term "immersive environments", seemingly to refer to the space where the game takes place though no explicit definition is given.

In addition, within sentences such as "If they are immersed in the activity they are more likely to engage in the learning activity" (p. 12; de Freitas, 2006)) it is not clear whether the term is being used to describe the experience of being within a virtual environment, or to describe a form of intense engagement.

Further, with respect to the use of a framework to evaluate the use of games within formal educational contexts, one of the questions suggested for practitioners to ask is whether the level of immersion provided is appropriate (de Freitas and Oliver, 2006). It seems implied that the more immersive the task, the more engaged the learner, and so the more effective the learning. However, no definition of "immersion" is given, and no evidence is given to support this implication. Further, it is not clear how practitioners are supposed to assess levels of immersion. In the two examples of how to use the framework in practice, the authors fail to address this question for the first, and for the second, they seem to suggest it is not important since the pilot examined did not involve the use 3D environments. The authors present immersion as part of the diegetic process i.e. as part of being involved when playing the game. They use the term non-diegesis to refer to the experience of being able to step back from the game and analyse it. At least with respect to formal learning, the importance of non-diegetic elements is emphasised by stressing the need for debriefing and reflection after gaming sessions, usually through a teacher. The suggestion here is that without being able to reflect on the game-playing process, all players will be able to experience is "mere immersion in to a virtual space" (p. 255).

In apparent contrast, Frasca (2001) argues that the immersive properties of video games are actually detrimental to critical thinking. In this case, immersion is used to

refer to "suspension of disbelief" (p. 167; taken from Murray, 1997). Frasca proposes an alternative approach to game design that challenges ideas from classical theatre, where the audience is typically passive. He refers to Brecht's Theatre of the Oppressed, where the audience and performers are forced to think about what they are watching by interrupting the sensation of immersion. In this case, the author uses the term immersion to describe deep involvement (which is presumably what occurs when belief is suspended).

It could be argued that both de Freitas and Oliver (2006) and Frasca (2001) are interested in promoting critical thinking but in different ways. Frasca wants this process to occur during play, within the gaming environment, while de Freitas and Oliver have it occur after game play. It seems that deep engagement is not sufficient for learning, but perhaps it is necessary. It is clear though that the term "immersion" is used in a variety of ways and does not always refer to the same experience.

2.2.1 The Digital Game Experience Model

A possible solution to the confusion surrounding the use of these terms is presented by Calleja (2007). Based on the conclusion that the term immersion is used inconsistently and the findings of his own research, he presents the Digital Game Experience Model (DGEM), which seeks to replace the metaphor of immersion with one of incorporation. The model is the result of his own gaming experience in MMOGs and interviews with other MMOG players. The term incorporation is used to represent a two way process where the player is immersed in an environment via an avatar, while he or she simultaneously internalises aspects of the game world.

He describes aspects of the experience with reference to six "frames", which can be used to describe involvement during the actual moment of game-play (micro level) and with respect to longer term motivations for playing (macro level). Calleja states that in order "to represent this fluid intermingling of players' experiential intensities, I decided to adopt Goffman's (1974) metaphor of the "frame" following Fine's research on tabletop role-playing communities ... Each frame represents a modality of meaning through which the role-playing experience is interpreted and performed" (p. 132). In addition, Calleja wants to avoid the binary implications of seeing "the virtual" as being in opposition to "the real". Instead the former is viewed as a constituent of the latter, and so there is a fluid movement in and out of these frames within the micro and macro levels while each frame can be experienced at the same time at various intensities. A summarised description of each frame presented by Calleja (2007) is provided below:

1) Affective involvement

This refers to the way the game affects the players' moods and emotional states through a cognitive, emotional and kinaesthetic feedback loop. The mode of representation is often important e.g. audio, visual. Other factors that can affect this frame are lack of interest in the genre and interruptions to the game. With respect to longer term motivations, players tend to interact with games in order to be engaged by them, and because they want to experience a change in mood.

2) Spatial involvement

This relates to the player locating themselves within the game world, both on and off the screen. A growing sense of familiarity here leads to feelings of comfort and

belonging which can make the player feel more involved in the world. On a macro level, the spatial frame refers to players' desires to inhabit and explore new worlds, something that games guarantee to provide since they are designed experiences.

3) Narrative involvement

This frame concerns the role of both personal and designed narrative. Growing personal narrative can still heighten affective aspects of the game even if there is a lack of engagement with the designed narrative, since this is what makes the game personally meaningful to the player. Part of the longer term appeal of games is that they allow the player to feel that they are contributing to the unfolding of the game's narrative. The closer the alignment between the designed and personal narrative the greater the degree of agency experienced by the player. Narrative may not be the most important motivation for game playing but it does provide the other frames with a sense of context.

4) Tactical involvement

This refers to any form of decision making and strategy formation within the game and includes interaction with the rules, the game environment and other players. In most games this frame is usually closely aligned to the performative frame. In the longer term, this relates to the satisfaction that players get from aiming for and achieving goals (whether these are goals set by the game, or that players choose for themselves).

5) Performative involvement

This frame refers specifically to how the player exerts agency within the game world, and is where the player actualises the strategies they have formed within the tactical phase. This relates to game piece control and movement within the game, their view of the world (first or third person) and involves mastering the controls. On the macro level, the appeal stems from a desire to exert agency within a virtual environment though the ability to do so does not guarantee satisfaction in itself, as player's actions do not always lead to the intended consequences. However, the unpredictability of outcomes can contribute to what makes games meaningful and compelling.

6) Shared involvement

Games can be distinguished from other media as by the fact they allow players to control agents in a represented environment in which other agents (either AI controlled or human in multiplayer games) react to the player. With respect to longer term motivations, Calleja points out that the earliest digital games were designed to be social affairs, and this is especially true of home console systems. While PC games have been less able to support this shared involvement, the rise of MMOGs has changed this and is one of the major motivators for taking part in such games.

Each of the frames describes these experiences on a continuum ranging from conscious attention to internalised knowledge. The frames are synthesised by the player through a process of internalisation, which leads the player to stop interpreting the game environment as separate to their immediate surroundings, thus shortening the distance between the player and game environments. When this occurs, the player has achieved incorporation: "the subjective experience of inhabiting a virtual environment facilitated by the potential to act meaningfully within it while being

present to others" (p. 219; Calleja, 2007). It should be noted that Calleja views digital game involvement as being qualitatively different to engagement with other forms of media because they require ergodicity i.e. non-trivial effort and for the player to interpret the events happening within the game as having happened to them (via their avatar). Therefore the model he proposes can only be applied to digital games and 3D virtual environments.

The DGEM was designed with MMOGs in mind, so it would be interesting to see how well it describes single player experiences and the new generation of console games. In addition, the model was based on retrospective accounts of game play so it would be useful to see whether it can be applied when discussing instances of observed game play to examine how incorporation occurs in practice. The way Calleja describes how the player incorporates the different frames is especially interesting from a learning perspective as one could ask if what he is really describing here is informal learning.

2.3 Research questions

It is clear that the literature on games and learning would benefit from being able to refer to a coherent model of player involvement with reference to what players are actually learning. Further studies are required examining the link between involvement and the informal learning that takes place whilst playing digital games. A common vocabulary would also be useful for describing the various forms of involvement that occur within and across different games. This would help further our understanding of what makes games engaging and could lead to the design of more effective learning environments.

The literature covered in this section indicate that there are problems surrounding how involvement is conceptualised within the field of Games Studies, and also suggest the link between player involvement and learning is not fully understood. In addition, it is not clear what methods would be the most useful for exploring these concepts. In order to address these issues, the following research questions need to be answered:

1. *How can we identify the learning processes that occur during game play?*
   - *Does this help us establish what is being learnt?*
2. *How can we describe the involvement that gamers experience during play?*
   - *Can the DGEM be used to identify the experiences of involvement that occur during play?*
3. *Is there an identifiable relationship between the learning that occurs and this experience of involvement?*
   - *Is the metaphor of incorporation useful for considering how these processes relate to each other?*
   - *If not, how else might we be able to describe this relationship?*

Chapter 3: Research design and methods

Egenfeldt-Nielsen et al. (2008) point out that the literature reflects the multi-disciplinary nature of this area of research, with researchers tending to adopt the methods of their primary field e.g. those in film studies tend to focus on reading the game itself. However, they also point out that this shouldn't matter as long as the methodology chosen is "best suited to answer the question at hand" (p. 8). It will be necessary then to first examine some of the methods used within the literature before deciding on the appropriate way to address the research questions outlined above. This will be followed by an outline of the proposed study. The chapter will then conclude with a discussion of the ethical issues that require consideration.

3.1 Background

Within the field of games and education, the distinction made between formal and informal learning is further reflected by the methods chosen to study each area. However, it is also interesting to note that a combination of both quantitative and qualitative methods is quite common. For instance, Joiner and colleagues carried out an investigation into the use of a racing car simulation called Racing Academy that was being used within a formal educational environment (Joiner et al. 2007). The evaluation consisted of a combination of methods including pre- and post-play questionnaires examining domain identity and motivation for both the course and the game, pre- and post-play tests to establish learning within the subject area, and open-ended interviews with both students and teachers who used the game.

With respect to informal learning, a pre and post test design is not really feasible as there are no fixed outcomes to assess. Similarly, de Freitas (2006) suggests that the

lack of connection between learning outcomes for formal education and learning in games that some studies have cited (e.g. Squire, 2005) could mean that "learning is not taking place or it may indicate that learning through immersive worlds involves a more complex understanding of learning, one that is not so easy to tie to specified learning outcomes" (p.18). It seems that the kind of learning that occurs during game play is not necessarily the learning researchers are testing for. This also implies that the area would benefit from studies that explore what players are actually learning.

In the area of MMOGs, academic focus within the field tends to be on social and collaborative learning since this is an integral component of the game play. For instance, Nardi and Harris (2006) carried out an "immersive ethnographic" study of *World of Warcraft* that focused on collaborative play. Through a series of participant observation, semi-structured interviews (both on and off-line), chat logs, *WoW* related documents such as websites, and participation in the game with two different characters in order to explore "player vs. player" and "player vs. environment" modes, they discovered that players engage in a variety of forms of collaboration, with friends and strangers, in order to learn how to advance within the game. The researchers note that "these interleaved collaborations create a richly textured space in which play flows between community-based and lighter weight collaborations" (p. 155). It seems this "multiplicity" of collaborations not only provides an element of novelty to the game, but also gives players an important learning resource. Adopting an ethnographic approach led to the collection of a rich variety of data on the social activity and organisation within *WoW*.

It could be argued that Calleja (2007), when developing the DGEM was using an ethnographic approach since he used a combination of observation and interviews whilst taking part in at least two MMOGs. His focus was not on social learning though but on the experience of player involvement. The inclusion of the shared involvement frame in his model seems to particularly emphasise the role other players can have on the processes of engagement and incorporation. In addition, he emphasises the role of his own participation: "I would similarly argue that the stretch of time I spent as an active member of the three virtual world communities (two servers on *World of Warcraft* and one on *Planetside*) were indispensable to achieving the outcomes of the research" (p. 111). This approach also aided the development of his model by giving him an insiders understanding of the games he was studying.

An alternative approach adopted by some researchers is to focus on the cognitive aspects of game-play. For example, Pillay (2003) carried out an exploratory quasi-experimental study where 36 teenagers, were assigned to one of three conditions: playing a puzzle game, playing an adventure game, and an experimental control. They were asked to use some software in order to complete a post test and timed on how long this took them. The experimenter then asked the children to verbally describe their actions while playing. The children also viewed recordings of their interactions after the problem solving session and were asked further questions to establish why they acted the way they did, based on an adaptation of conventional protocol analysis known as the precursor, action, result and interpretations (PARI) method which revolves around "situated problem-solving sessions where individuals deploy knowledge in response to particular problem contexts and task demands" (p. 340). The interviews were then analysed for the different cognitive processes the

students engaged in. The quantitative analysis revealed that the adventure game group performed better than the other groups (perhaps due to the closer transfer between tasks) while the qualitative analysis indicated that students engaged in different forms cognitive strategising as a result of the different underlying structures of each game.

It can be argued that Ericsson and Simon (1993) would not agree with this adaptation of protocol analysis as it could lead to reports that are less valid and complete than they could be. The authors differentiate between concurrent and retrospective reports and indicate that concurrent reports are generally a more accurate representation of cognitive processes. Further, they make a distinction between asking someone to "think aloud" (concurrently or otherwise) and asking them to explain or justify their actions. The authors argue that the latter will actually change the sequence of thoughts and often results in a change of behaviour. This appears to contrast with PARI method outlined by Pillay (2003), where participants are probed not only about what they did but also for "their interpretations of the results of those actions" (p. 340). However, Pillay goes on to point out that "Zimmerman and Martinez-Pons (1988) found that post experimental reports (oral or written) strongly correlated with the subjects' actions. This gives rationale for considering self-report as indicators of learners' cognitive processing." (p. 341).

Think aloud protocols have also been used within the field of human computer interaction (HCI). In a study carried out by Guan and colleagues, the validity of stimulated retrospective think aloud (RTA) protocols as a usability evaluation method for both complex and simple tasks was tested (Guan et al., 2006). The RTA

group was "stimulated" by viewing videotaped stills during the think aloud process that served as memory cues. The experimenters concluded that their use of RTA was both valid and reliable, based on the use of eye tracking data to confirm reported sequences of attention, and that the method is not affected by task complexity. However, it does seem there is a greater degree of omission (i.e. failure to report an action revealed in the eye tracking data) for complex tasks. Interestingly, they go on to suggest this method would be useful for looking at tasks where concurrent think aloud is more difficult, and use games an example.

In the field of HCI, think aloud protocols have been used to study video games, where the interaction focused on is play. Barr et al. (2006) used a qualitative case study approach to explore the link between the interface and the values expressed during game play. The case study approach involved gaining first hand knowledge of the game, video taped observation with concurrent think aloud with two participants, DVD capture of game play, semi-structured debrief interview and analysis of both official and unofficial game documents. Grounded theory was used to analyse the data, which allows categories emerge freely from the data (as opposed to defining them before analyses). As a result, the analyses focused on the relationship between the commands in the game and the conduct of the avatar, and the recognition of two values termed "play" and "progress". Barr and colleagues concluded that the method they chose was an effective way of exploring the effect of game interface on player expression of value. While little is said in this publication about the information produced by think aloud protocols, Barr states that "during an interaction as immersive as video game play, participants often found it difficult to continue

talking" (p. 56; Barr, 2007) suggesting the technique was not as effective at eliciting player beliefs as originally supposed.

3.2 Research design

It seems then that there are a multitude of methods for examining learning and the experience of game play. With respect to the study proposed in this paper, the focus on exploring informal learning processes and lack of pre-defined outcomes, mean that a pre and post test design to be unnecessary. In addition, while the literature indicates that both learning and involvement can be influenced by the presence of other players (both on and offline), the emphasis in this study is on the mediated interaction between player and machine in order to focus on the experiences of involvement and learning that occur during single player mode.

The approach adopted for this project is essentially an observational case-study approach using multiple qualitative methods, similar to Barr et al. (2006). Stake (1998) points out that a "case study is not a methodological choice, but a choice of object to be studied" (p. 86). For the purposes of this research the, the object of study is the player's interaction with a specific game, so the case includes both the player and the game. With respect to methods, the object will be studied through the use of participant observation and interview, an approach that could be described as ethnographic since the project seems to fit with the definition of ethnography provided by Atkinson & Hammersley (1998). They suggest that ethnography has the following features: an emphasis on describing the nature of a phenomenon, having to work with and collect unstructured data, dealing with a small number of cases and employing an analysis of human action that is both descriptive and interpretive. They

also point that there are various of dimensions to participant observation in terms of how much participation occurs, how well known the researcher is to the other participants, what they participants know about the research, and how much the researcher adopts the role of insider. With regard to this project, I can be seen as a participant in the sense that I identify as a fellow game player, and wanted to keep the player's interaction as natural as possible (e.g. conversing with participants during the session if they so chose). I describe my own interests in gaming in the section below, and discuss how much information participants were given about the study in the section on ethics. Finally, in Chapter 5 I point out how well known I was to each of the participants. While it would have been preferable to carry out the research within the participants' natural game playing environment (and more consistent with an ethnographic approach) the logistics of moving equipment around and gaining access to their homes meant this was not feasible.

The research questions outlined above focus this study on exploring what players are thinking and feeling during play in order to further our understanding of what they are learning and how engaged they are in the game-playing process. According to Ericsson and Simon (1993), concurrent think aloud should not be used for "perceptual-motor tasks with severe real-time constraints, such as juggling and ski racing, where even a modest slowing down could be disastrous" (p. xvi). While the result is unlikely to be physically disastrous, it could be disastrous in terms of performance within certain games, especially those categorised as action games by Egenfeldt-Nielsen et al. (2008). In addition to Barr's comments about the difficulty he had in using this technique, it would appear that a retrospective think aloud method would be more useful in this case. In fact, in accordance with Guan et al.

(2006), a stimulated RTA where participants are interviewed immediately after the session and shown footage of their own game play to cue their recall seems appropriate. Nisbett and Wilson (1977) in their critique of protocol analysis, claim that it can be a valid approach when asking participants about their emotional state (though not necessarily when asking them the reasons behind it), so participants in this study will also be asked to remember what they were feeling during play. In addition to asking about their thought processes, asking about their emotional state may give us further insight into their experience of involvement. The DGEM (Calleja, 2007) will then be applied to specific instances to see if they can be described by the six frames and the metaphor of incorporation.

3.2.1 My own interest in games

In accordance with the ethnographic literature on games (Nardi and Harris, 2006; Calleja, 2007) it seemed important that I have a personal understanding of and interest in games and gaming. While I have always considered my self a player of video games, I also started to follow numerous blogs and websites within the gaming community to keep up to date with the latest developments and discussions. Some of the blogs I've been following include: GameSetWatch; run by the staff of Gamasutra (a website for game developers and related news) and Game Developer Magazine, which posts links, articles and hosts columns to do with various aspects of games and the game industry, Penny Arcade; a webcomic and blog concerned with games and gamer culture; and Sexy Videogameland; the blog of game journalist and reviewer Leigh Alexander. In addition, I started my own blog "Seventh Generation Games and Learning" to keep track of my own gaming experiences and reflections.

3.2.2 Selection of games and consoles

One of the first decisions to be made regarded the selection of games to be used in the study. As the approach adopted was an exploratory one, it was decided to focus on a range of different types of games in order to test the utility of the method. It was important that participants were familiar with the game they would play, in order to identify what learning occurred beyond the learning of game controls, and so they could focus their attention on the game play. It was also important for them to play something they would actually choose to play, in order to keep the interaction as natural as possible. In order to satisfy these requirements, they were asked to bring in their saved game progress. The Nintendo Wii was chosen as the console to be tested for a variety of reasons; it is currently the best selling seventh generation console, it can be distinguished from other consoles by it's one-handed wireless controller with tilt, position and motion sensors which can be attached to a variety of peripherals including a nun-chuck (see Figure 1; "History of video games", 2008) and because saved game data can easily be transferred between consoles via an SD card.

Figure 1: Wii, TV, and a nun-chuck attached to the Wiimote

The initial recruitment letter (Appendix A) specified a list of games that potential participants could choose to play, provided they had had some experience of playing them. However, the list seemed to constrain the number of people that could take part in the study and the few initial replies received where from participants asking whether they could play something else. As a result, the final recruitment letter did not specify any games. Participants were allowed to choose any game, as long as they had been playing it recently (see Appendix B). Further, due to my own gaming experience and interests, I was still familiar with the titles the participants wanted to play.

3.2.3. Participant recruitment

Participants were essentially recruited from an opportunity sample of adult gamers with the only requirements being that they either owned or had regular access to a Wii console and that they had played the game of their choice prior to the

observation session. Permission was sought and granted for a recruitment letter to be sent out via three different mailing lists to enlist people who would available for testing on the Open University (OU) campus. The Digilab at the OU library agreed to set out some posters, in order to recruit people who used the gaming facilities provided by the library. A member of the Student Research Project Panel was also contacted in order to ensure that special permission did not need to be obtained for sending out recruitment adverts which students would also receive.

3.2.4. Ethical issues

The British Psychological Society Code of Ethics and Conduct (2006) was chosen as an ethical guideline since it seemed appropriate to the nature of the research study. This meant following the ethical principles of respect, competence, responsibility and integrity. Following the principle of respect meant participants were given a form to sign at the start of the study to inform them of the nature and goals of the study, which alerted them to the fact they were allowed to drop out at any time and assured them that all data collected was confidential and would only be seen by those involved in the study. It also asked them to address any queries they had to the researcher, whose contact details they were also provided with. Competence meant maintaining awareness of potential ethical issues and keeping up to date on ethical codes. An ethics proforma was filled out and sent to John Oates of the Ethics Committee to find out whether the study needed formal ethical approval (reference #460). However, this was not deemed necessary as the risks involved were seen to be minimal. The principle of responsibility covers the notions of avoiding harm and debriefing participants. In accordance with this principle, a decision was made not to use subjects under the age of 18 to avoid the issue of the effect violent video games

may have on children (Byron, 2008), while all participants were debriefed at the end of the study. Finally, the principle of integrity was upheld through the standards of honesty and accuracy, avoiding exploitation and maintaining personal boundaries.

Chapter 4: Collecting and analysing the data

This chapter describes the data collection and analyses process. This will include a description of the lab set up, the equipment used and the procedure followed. The chapter will conclude with an explanation of how the data was analysed.

4.1 Data collection

4.1.1 Setup and equipment

The sessions were carried out within one of the labs within the Jennie Lee Building on Walton Hall Campus on the OU campus. A TV and Wii console were required, including a Wiimote and nun-chuck, while cameras and a video store were required to record the session. During the interview, the recording of the TV screen was replayed to participants in order to cue their recall of what they were thinking and feeling during the session. The gaming session lasted half and hour, while the post-play interview lasted no more than 45 minutes.

Figure 2 below illustrates the equipment used in the final set up. The digital video store recorded the game during the play session, which could then be played back during the interview session. The recording was also stored so it could be made into a movie for future playback. The camera recorded both game play session (i.e. the participant as they played the game) and the post-play interview session (i.e. the participant and myself discussing the game). The camera recordings were converted into video formats for later playback.

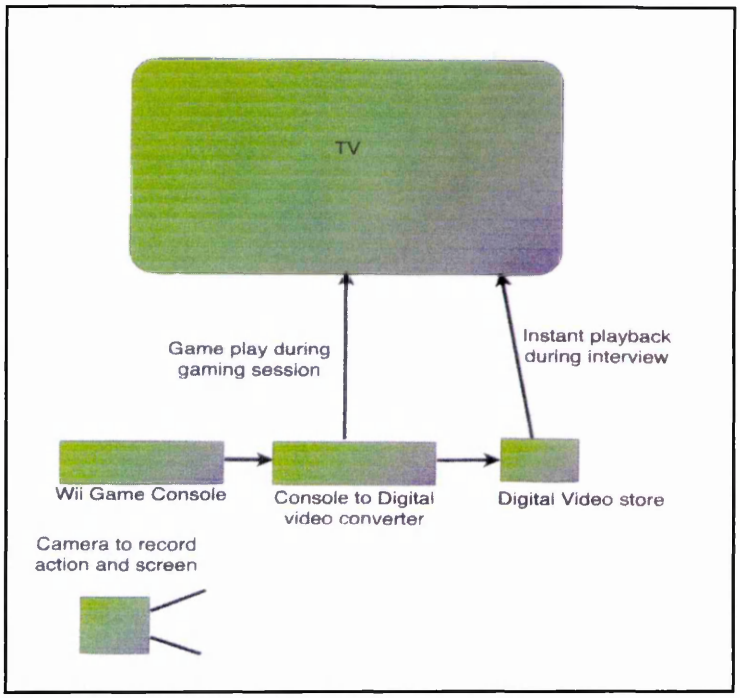

Figure 2: Equipment used within the study

4.1.2 Procedure

Participants were first asked to sign a consent form which informed them of the nature of the study and its main goals. They were asked to sign to indicate they consented to take part in the study, and sign again to consent to the later use of the recordings e.g. for conference purposes (see Appendix C). They were also given a short questionnaire prior to the session in order to assess their gaming history, habits and preferences. The questionnaire was adapted from a previous project I worked on (Joiner et al., 2007) where the categories of game play were taken from Prensky (2001). The final category "Rhythm games" was added after one of the participants noted the lack of a category for a game like *Guitar Hero III* (which he had chosen to play). The final version can be found in appendix D.

Participants were then given the instructions (discussed in the pilot section below) on what they should pay attention to during the game play session. In order to make the participants as comfortable as possible, and keep the interaction as close to their usual game play behaviour, they were provided with some refreshments and biscuits, and asked to try and behave as they normally would when playing the Wii.

Participants then played the game of their choice for half an hour. I was present during this time, and took notes during the session. After this, the participant and I reviewed a recording of the game play, while the interview itself was also recorded. Participants were asked to report what they were thinking and feeling during play, especially at points where they seemed to have difficulty in the game e.g. when they got stuck on a level in *Super Mario* or when they missed a several notes in *Guitar Hero III*. The participants were also encouraged to stop the recording whenever they wanted, to discuss an episode further. The interview concluded with some general questions about the participant's conceptions of learning and involvement. The answers to these general questions were not included in the analyses however, as the research questions could be addressed without them, and it was decided their inclusion would be beyond the scope of this project.

4.1.3. Changes made after the pilot session

An initial pilot session was carried out, with two changes made to the procedure as a result. The first regarded the set of instructions that were given to the participant prior to the game-play session. The initial instructions were taken and adapted from Ericsson and Simon (1993) which consisted of some think aloud examples and instructions that were intended to elicit think aloud protocols (Appendix E).

However, after the pilot session it became apparent that while participants seemed to understand the instructions when they received them, they did not discuss their game playing experience in the same way. It seemed more natural for them talk about what they thought and felt, and sometimes make explanations about their behaviour, rather than to try and remember the exact sequence of their cognitions at various points in the game. In accordance with Pillay (2003) it was decided that it would not be a problem to allow participants to explain what they were doing so the instructions were adapted in order to make them simpler (Appendix F). Ericsson and Simon (1993) do suggest that explanations are a less accurate form of verbalisation since they are subject to inferences and rationalisations, but the use of the video as a cue should help make their recall of what they experienced more accurate (Guan et al, 2006). The accuracy of the reports is also increased by the fact that the interviews occurred immediately after the task (Ericsson & Simon, 1993).

The second change involved how the equipment was set up. Initially two cameras were used; one to record the player as he or she faced the screen, the second to record the game-play on the TV. In order to simplify matters, the set up was changed to include a single camera and a video converter that could be used to replay the game-play without the assistance of the technician. The final setup can be seen in Figure 3.

Figure 3: Photo of the lab and equipment

4.2. Data Analyses

After each session, the recordings of both the game-play and the interview were reviewed and further notes were added to the field notes concerning the main actions the player took in the game and the post-play cued interview. These notes also included an initial interpretation of how the DGEM could be used applied to describe both the events that occurred and the explanations that were given. This information was organised into tables for each case study (appendices G to K).

The data was then organised into a case-study document for each case, which included all the data gathered and a description of the main points of interest. In usability testing a critical incident is defined as "an event that has a significant effect, either positive or negative, on user task performance or user satisfaction with the interface" (p. 54; Gabbard et. al, 1999) and this definition was adopted as a guideline for selecting which episodes to analyse further. Similarly, there are critical threads; defined as "sets of causally related user episodes that, taken together, define major usability themes" (p. 245; Koenemann-Belliveau et al., 1994). The emphasis in this

study was on the instances or recurring themes that had affected the player's experience. The DGEM was used to analyse and describe these episodes according to the frames the player was engaged in and to identify whether incorporation was taking place. Where possible, any evidence of learning was also described, usually with reference to what the player had internalised.

Chapter 5: Interpreting the data

This chapter presents the data and interpretations of it on a case-by-case basis. Space limitations meant that only a partial version of each can be presented below, but the complete case studies can be found in appendices M to Q. These brief case studies include some background information about the participant, a description of the game chosen, a summarised example of a critical episode or theme as described by the DGEM and some initial conclusions. The pilot is included as despite the initial differences in the lab setup and instructions, the data was seen as being relevant to the research questions.

5.1 Pilot case: Participant A and Super Mario Galaxy

Questionnaire

A is a 24 year-old full time postgraduate student at the OU and a friend of mine who I have played video games with. He started playing video games between the ages of 11 and 13 and plays games several times a week on average. During the week his gaming sessions last about an hour, with this rising to two hours at the weekends. In general, he plays action, adventure, fighting, role playing, and strategy games.

Game chosen

The game in this case was *Super Mario Galaxy* which can be described as an adventure game. This is the latest version of the Super Mario platform series, though this time in 3D. As Mario you have to travel through various planets and galaxies in space in order to rescue Princess Peaches from Bowser. You require both the nun chuck and Wiimote to navigate the game world and defeat your enemies.

The Boss fight – Thinking on the spot

This episode was selected because it was A's second attempt at the boss fight and can be seen as example of learning that led to success within the game. It is also a good example of how incorporation occurs in practice.

The second time A encounters the boss, King Kaliente (see Figure 4), he has only 4 of 6 sections of his "life" left contributing to the sense of anticipation that A stated he was experiencing. As Mario lands on the new planet, alarms bells start to sound and dramatic music starts to play, affectively involving the player by creating a sense of tension. A has little time to take stock of the situation as the platforms he has to stand on start to sink into the lava the longer he spends on them. In the meantime, the boss starts to shoot missiles towards him, three brown ones at a time. The boss then shoots out a single green projectile, which A immediately jumps for, and spins back towards the boss. The missile hits the boss and seems to damage him. In addition to everything that's going, blue creatures start to emerge from the lava and head towards Mario. There are certain things A has already internalised from this session (including what he's learnt by his first attempt at the boss) and from his previous game play. These are things like the game controls (performative frame), the fact that bosses are usually hard (narrative and shared), the layout of the level (spatial) that he can return green missiles (tactical), that the platforms will sink (performative), and that the lava and the blue creatures will hurt him (performative and shared). Meanwhile, all this activity suggests the tactical and spatial frames are very closely aligned to the performative frames, as A has to think about how he can defeat the boss and assimilate his new environment, all while avoiding the lava, enemies and projectiles. The music adds to the tension as does the annoyance he feels whenever

he loses a section of health (affective). It is interesting to note that A looks very concentrated whilst playing this level, and this includes him occasionally poking the inside of his cheek with his tongue.

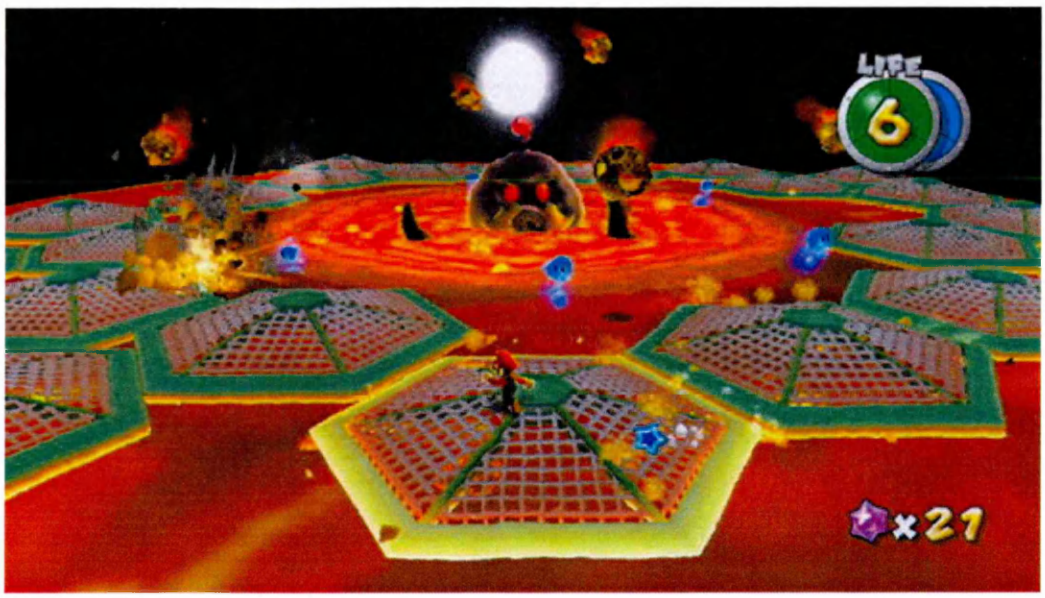

Figure 4: Mario fighting King Kaliente

As the episode progresses, A returns more than one green missile in a row, and the King's reacts by spluttering and turning red. This is something A recognises as "the next stage of boss" from his previous gaming experience and it convinces him he has found the correct strategy to defeat his enemy. He eventually manages to return enough successive missiles to do so, which can be described as the actualisation of tactical involvement within the performative frame. The internalisation of all this knowledge and experience culminates in deep sense of involvement that A testifies to when he talks about how relieved he was once he finally defeated this boss.

Conclusions

In this case, the DGEM effectively accounts for the how both the game affects the player and the player acts within the game in order to achieve a sense of incorporation, which refers to both the experience of internalising aspects of the game and to being able to act meaningfully within it. Further, it allows for a discussion about what the player has internalised previously, and during the session itself, which feeds into their experience of involvement. This effectively accounts the learning that occurred prior to and during the session and in fact, suggests that it is not so much learning that requires involvement but that deeper levels of involvement require certain types of learning to have occurred in the first place. Without a certain level of internalisation it seems unlikely that incorporation would have occurred at all.

5.2 Case 1: Participant B and Wii Fit

Questionnaire

B is a 52 year-old OU staff member who I had not met prior to the gaming session. She started playing video games after the age of 18 and plays several times a week. Her gaming sessions during the week and the weekend last around an hour. She likes to play adventure and puzzle games, in addition to *Wii Fit.*

Game chosen

Wii Fit is an exercise game developed by Nintendo to make keeping fit fun. The player can engage in four types of training activities; yoga, aerobics, strength training and balance games, which require the use of the balance board peripheral (see Figure 5). The balance board is also used to carry out a body test (which measures the player's centre of gravity, weight and BMI, and body control to give them a Wii Fit

age). The game also takes advantage of the player's Wii Mii (a customisable avatar used in different games, intended to capture the player's likeness). *Wii Fit*'s popularity is indicated by the fact that, at the time of writing, some suppliers (e.g. Amazon.co.uk, Woolworths) are sold out of the game, or are selling it for well over the suggested £69.99 retail price.

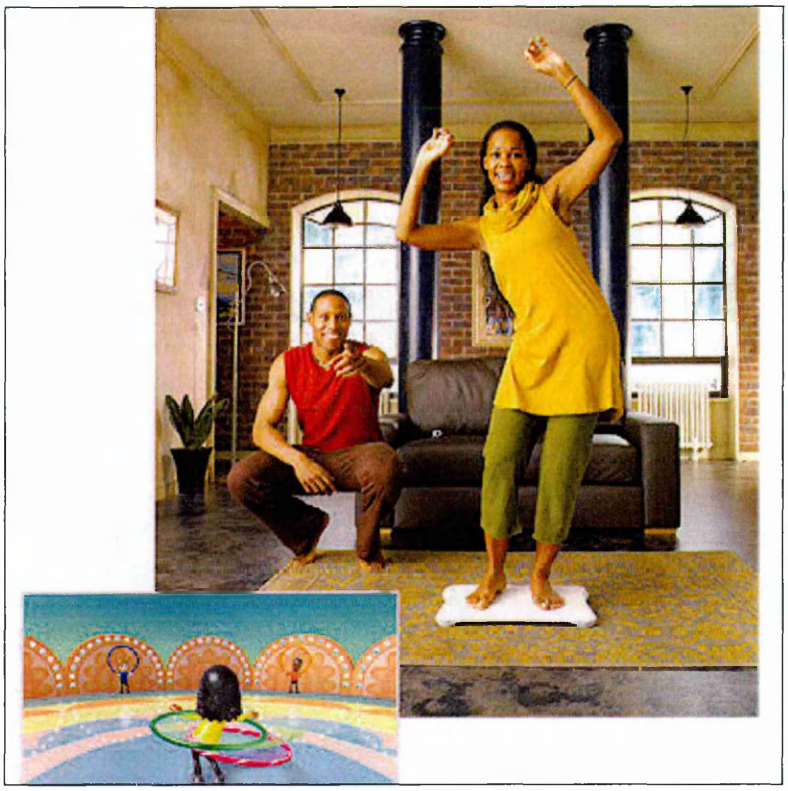

Figure 5: Wii Fit promotional photo of player using the balance board to play the Hula Hoop game

Miis – The importance of sharing

This issue was selected as it was a reoccurring theme throughout the session that seemed to have a significant effect on B's sense of involvement. While there is little emphasis on learning in this case, it is an interesting example of how the shared involvement frame can affect the player experience even when they are not actually playing with anyone (co-located or otherwise).

One of the first things that came up during the session was the fact that B's Mii and those of her family and friends were not part of the saved game file. This not only meant that her avatar did not resemble her, but that the Miis of her family who use *Wii Fit* were not present and neither were any of the other Miis her son had added to the game to represent other family members and friends. During the aerobics class the player assumes a first person view, with a line of Miis in front of her. As soon as B saw the other characters she said "You see, I don't know these people". During the gaming session itself and the interview, B was keen to point out that not only did these other Miis not look familiar but they did not turn round and smile at her after she completed a certain number of "Perfect" steps, as they usually did. B stated that this time it felt "far more individual" and it is reasonable to assume that this was due to a lack of familiarity and the lack of encouragement received from these "strangers" thus reducing her sense of shared involvement. The Mii issue crept up again in the Table Tilt game. In this balance game, the balls she is supposed to navigate into different holes by tilting the virtual board (through leaning on the balance board) have the faces of other Miis on them (see Figure 6). B states that she often calls the balls by the name of the person they represent and goes on to say that "you actually engage with who it is, it's sort of like your mum who is being awkward and not going in".

Figure 6: Screenshot of Table Tilt

A further extension of this shared involvement has to do with *Wii Fit's* ranking system, thus tying it in with performative involvement. After every exercise is completed, the player is presented with a score, and a star rating which indicates how well they have completed the task e.g. in the Aerobics class this is based on the number of correct steps achieved and how accurately timed they were. In addition, *Wii Fit* ranks the player along with all the other players who have attempted this task, so that they can compare their performance with other family members and friends.

Conclusions

While learning was not observed during the session itself, B's familiarity with the game and expectations made it obvious that a certain amount of internalisation had already occurred and the DGEM seems to be a useful framework for discussing the issues that did come up. What is especially interesting about this case is that it illustrated how the participant was affected by the presence (or in this case absence) of people that were not actually playing with her at the time. *Wii Fit* manages to maintain a sense of shared involvement and a sense of competition in order to extend

the experience beyond the interaction between an individual player and the game. Arguably the Mii issue affected the process of incorporation as the exercises "felt different" and she "felt less engaged". This seems due to the fact she was unable to share the experience with other Miis (reduced shared involvement) and also because she identified less with her own Mii who didn't have black hair and glasses "like I do" (reducing her sense of agency within the performative frame). While B's expectations indicate internalisation has occurred, they were not met and so her experience of affective involvement was interrupted.

5.3 Case 2: Participant C and Boom Blox

Questionnaire

C is a 31 year-old member of staff at the OU campus who is also an acquaintance of mine from the department. He started playing games between the ages of 11 and 13 and plays them several times a week. During the week sessions last about two hours, with this rising to three at the weekends. He plays action, adventure, puzzle, role playing, racing, and strategy games.

Choice of game

Boom Blox is a puzzle game developed by EA in conjunction with Steven Spielberg. The game play revolves around the player using the Wiimote to throw at, grab or blast various configurations of blocks in order to solve series of physics-based puzzles. The puzzles involve either knocking over block structures within a certain number of throws, or having to carefully grab and pull out a certain number of blocks (similar to Jenga) without causing the structure to topple.

High Horse Task – When player tactics don't lead to success

This episode was selected as an example of a critical episode that showed evidence of some learning but also the frustration that can occur when a player's efforts do not lead to a successful outcome.

One of the levels C attempted several times was the High Horse task (in Grab Tool, Explore Mode). In this level he has to gain a certain number of points to succeed, which he gets from removing blocks from the structure before causing the grey block on the top to fall off (see Figure 7). He loses points for any blocks he accidentally knocks off. In total, he tried this six times but never managed to complete the level. The fact that he kept trying can be seen as evidence of his involvement with this task, plus he also stated he got "really into this one" during the interview and was "very focused". His attempts illustrate the process of incorporation as he is essentially internalising the knowledge that he gains from each frame, specifically the spatial (as he familiarises himself with the structure of the blocks and tries out different camera views), tactical (as he tries to figure out a strategy) and performative (as he pulls at the blocks and actualises the tactical phase). In terms of strategy, he first started pulling blocks from the bottom of the structure but soon realised the vertical blocks in the middle were going to cause him so he then started pulling blocks from the top. Later he starts to grab at any falling blocks before they hit the ground to avoid losing extra points, and finally he starts to count the remaining blocks in the stack to work out how many points he can get without touching the trickier vertical blocks.

Figure 7: Screenshot of High Horse as the player pulls out a block from the structure

Earlier on in the task C talked about how he felt like his heart felt like it was in his mouth at certain points e.g. when blocks seem to bounce back, but his affective involvement gradually turned into frustration with later attempts as his strategies did not lead to success i.e. he failed to actualise the tactical phase within the performative frame. This was compounded by the occasional issue he had with the controls when the "elastic string" the blocks were attached to as he pulled them out (see Figure 7) caused the blocks to act in a way he did not expect by bouncing back, again interrupting the performative frame. It could be argued that as a result of these issues and by the end of his last attempt, C had lost any sense of incorporation he may have felt, resulting in his quitting the level and deciding to play a completely different type of level afterwards (which involved exploding blocks instead). It is interesting to note though, that while he did give up on the exercise, during the interview B still seemed to be engaged the tactical phase (though on a macro level) as he seemed to be considering what he would do next time he approached the task.

Conclusions

The attempts by C to try out different strategies within the performative frame can be seen as evidence of learning in the sense that he was trying to improve on his previous strategies and continuing to internalise both the spatial and tactical frames. However, this was ultimately a frustrating exercise as he could not actualise this knowledge effectively in the performative frame, which had a serious negative impact on his affective enjoyment. His frustration was further compounded by control issues and ultimately led to his decision to quit and try something else. Arguably, each failure made his actions feel less and less meaningful and so he lost any sense of incorporation. The DGEM was useful here in describing an incident of negative involvement and how a failure to internalise the frames successfully can lead to an experience of frustration.

5.4 Case 3: Participant D and Guitar Hero III

Questionnaire

D is a 30 year-old staff member at the OU who I had not met prior to the study. He started playing games between the ages of 5 and 7 and plays several times a week. Gaming sessions last about hour during the week and at the weekend. In general, he plays puzzle games and rhythm games, like Guitar Hero.

Choice of game

Guitar Hero III is the latest in the popular series of music video games that uses a guitar-shaped peripheral to simulate the playing of rock music, represented on-screen by coloured notes that correspond to the fret buttons on the controller. In the Wii version, the Wiimote is inserted into the peripheral to take advantage of its motion sensors (see Figure 8). Notes are played by holding down the appropriate fret buttons

for the time indicated, while there is also a whammy bar which can be used to gain extra points. Player's performance is measured by rock metre (if this drops too low the player will fail the song), a score metre (which contributes to the star rating the player receives at the end of the song – the player can receive up to five stars) and multiplier (which multiplies the points the player gets based on their accuracy). If the player manages to hit all the notes within special sections of notes, illustrated by a star shape around the normal note, the blue bars above the rock metre light up informing the player they know have "Star power". To activate this, the player must tilt the guitar controller, which will result in doubling the multiplier.

Figure 8: Guitar Hero III controller

The need for practice – enjoyment and strategy

This theme was selected because it illustrates the strategies the player employed when approaching a new task within a game he was very familiar with.

In *Guitar* Hero, there is a close alignment between the affective (the music), tactical (the notes on the screen) and performative frames (having to play the notes) that also requires the player to orientate themselves spatially in the environment outside the game (by holding the guitar controller, playing the notes, and tilting the guitar at specific points). When D played "Go that far" and "Heir kommt Alex", both songs he had not played before and thus had not internalised, he suggested that there were less enjoyable than familiar songs and that you need to play new songs more than once and get "a feel" for them. It can be argued that D's affective involvement when learning new songs is reduced by his need to pay conscious attention to the performative, tactical and affective aspects of the song and so it is only once he internalises this knowledge through practice that he can reach a greater degree of involvement. Further, it appeared that one of D's main motivations for playing *Guitar Hero* was his desire to achieve five gold stars on the songs he played (macro performative involvement). Since this was unlikely when playing a new song, this quite possibly contributed to lower affective involvement during the instance of play.

During the interview, D stated that while he pays attention to the notes coming up ahead on the screen, he actually tries to listen for when he should press the appropriate fret buttons as he does not find the timing of the game (in terms of the visual representations of when notes should be pressed) to be accurate. It is difficult to tell from the recording whether this is the strategy he employs all the time, but it is interesting to note what occurred when he missed larger sections of notes in unfamiliar songs. For instance, during "Go that far" he missed a number notes in a row during a certain pattern of yellow and green notes (see Figure 9). He missed enough notes for his rock metre to go into the red. However, he managed to avoid

being booed off stage and became more successful at the pattern he was having difficulty with. When questioned about this during the interview, he described how he was trying to get a feel for the rhythm of the song and so kept waiting for a new bar in order to "jump back in". While he looked to bottom of the screen for guidance, he found it disconcerting as there seemed to be a mismatch between when it sounded like he should press the notes and when the game actually told him to press the notes. Essentially, there was a mismatch between the information provided within the performative and affective frames so he made a tactical decision to focus on the affective.

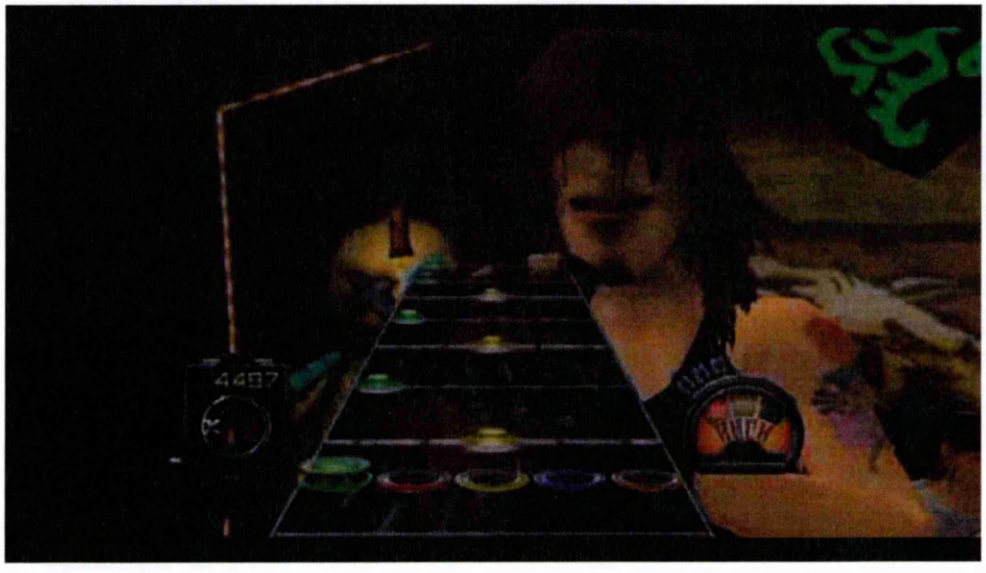

Figure 9: Screenshot of "Go that far" section that D had trouble with (note the red rock metre in the left corner)

Conclusions

The DGEM helps to describe how the game-play is experienced by the player and seems to suggest that deeper involvement is dependent on learning since players have to have internalised enough of the song in order to achieve a sense of incorporation. While on the surface, the spatial frame seems less influential in a

game like this (as there is no virtual world to explore), the close alignment between the physical actions the player carries out with the guitar controller and how they are interpreted in the game world (via their avatar) seem to allow for a different sense of spatial (physical) involvement. It is not so clear whether incorporation can occur in this case, though it is clear that a deeper sense of involvement can only occur if the player has internalised enough of the song to enjoy playing it within the affective frame.

5.5 Case 4: Participant E and Boom Blox

Questionnaire

E is a 34 year-old postgraduate student at the OU and a friend of mine who I have played video games with. He began playing digital games between the ages of 8-10, and plays daily. During the week sessions last about an hour, while at the weekend this extends to 3 hours. He likes to play action, puzzle, racing, strategy, and rhythm games.

Choice of game

Initially E requested to play *Guitar Hero III* but due to technical difficulties he switched to *Boom Blox*, which he had played recently. Cases 2 and 3 include descriptions of these games.

Instructions – do they help develop tactics that lead to success?

This theme was selected because it indicated how information provided by the game can affect both the player's experience of involvement and learning.

One of the issues that reoccurred was the fact that E found the instructions given prior to each task more like clues than instructions. He found them "kind of coy" and as a reaction to this, found himself trying to memorise what they said so he could repeat them during the actual task. The instructions sometimes gave information about what to pay attention to, and so they are essentially part of the tactical involvement frame. In some instances, they were helpful in successfully actualising the tactical phase within the performative frame. For example during the Sliding Bomb task the instructions stated "Blast down a ramp for the big Bomb Block to slide on! Once it starts moving, you're golden!" and so he realised he needed to create a ramp to successfully complete the level. Further, when reviewing the Chem Towers task, D pointed out that the instructions – "Bring the two Chemical blox together for explosive results! Aim low to do it in one throw!" had effectively primed him to throw lower at one of the structures, and thus he performed the task effectively.

However, there were occasions when E did not find the instructions helpful. At the start of the Beakers task, he is told "Drop the Chemical Blox into each other to start a chain reaction and clear all the Gem Blox in just one throw!" but could not figure out a strategy achieve this so actually restarted the level in order to re-read the instructions. Similarly, in Kick Stand, he is told – "Kill two birds with one stone to get the Gold in this level" – but this annoyed him because he could not see how the spatial and tactical frames could come together for him to be able to get all the gems in one throw (see figure 10). It could be argued that he gets frustrated when the instructions only tell him that he can succeed in one throw without suggesting how this could be done. In this sort of instance, there is too much of a divide between the

tactical and performative frames for the player and this resulted in a sense of frustration within the affective frame, as the player does not know how to bridge this gap.

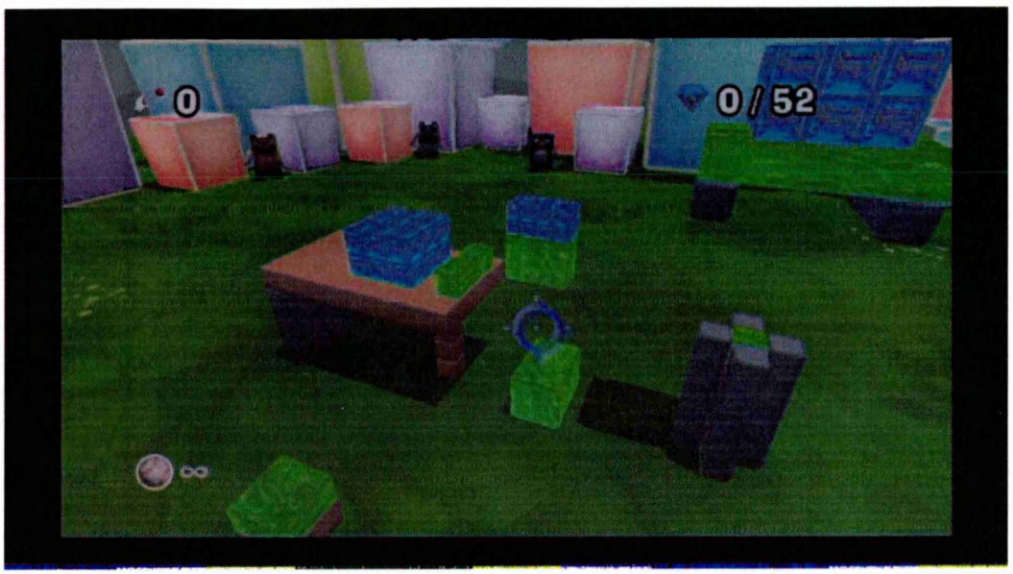

Figure 10: Screenshot of Kick Stand in which one throw is required for a gold medal

Conclusions

The DGEM helps to illustrate the connection between the information provided in the game, how this can both aid and hinder learning and how this in turn influences player enjoyment. When the instructions gave the player some idea about what tactics to try, they did help lead to success. However, they were sometimes ambiguous and failed to help the player develop a strategy within the tactical frame, and so they were interpreted negatively within the affective frame. It is also interesting to note that success seemed to be defined by achieving gold (a performative motivator) rather than passing the level with silver or bronze. The expected results were not achieved within the performative frame, making the player's actions seem less meaningful, and so incorporation was unlikely to occur.

Chapter 6: Discussion

This study aimed to contribute to the research on games and learning by developing a method to further explore the link between involvement and informal learning that players experience whilst playing digital games. Part of the method included the application of the Digital Game Experience Model to test out its utility within the area of games and learning. This final chapter seeks to summarise the main findings by relating them to the literature reviewed and to the research questions outlined in Chapter 2. The chapter will go on to address the limitations of the study and to provide some suggestions for further research.

6.1. Findings

6.1.1 Learning

1. How can we identify the learning processes that occur during game play?

1.1 Does this help us establish what is being learnt?

In order to identify the learning processes that occurs during play, the combination of observation and interview did seem very useful. During game play, learning can be identified by successful progression through the game, such as A's victory over the boss in *Super Mario Galaxy.* In addition, the cued interview was helpful in developing a richer understanding of the processes the player was engaged in at the time. It was also interesting to note instances when successful learning did not occur, as example of what can go wrong in the learning process e.g. when C repeatedly failed High Horse in *Boom Blox.*

Once these critical themes and episodes had been identified, the DGEM was then used to successfully answer the question of what is being learnt by reference to what was internalised within each of the six frames. For example, participant A learnt the strategy required to beat the boss by interpreting the King's reaction (affective) to his strategy of attack (tactical) leading to success within the performative frame. The model also allows for a consideration of what the player brought with them, by identifying what had been internalised previously. Further, the player's experience on a macro level can be use to account at least some of the non-diegetic elements of game-play e.g. when participant C showed evidence of tactical involvement by considering his next attempt at High horse during the post-play interview. It can be argued that the method has potential to further our understanding of how people learn through play with reference to what they learn.

6.1.2 Involvement

2. How can we describe the involvement that gamers experience during play?

2.1 Can the DGEM be used to identify the experiences of involvement that occur during play?

It seems the combined approach of observation and interview was also able to deal successfully with the second question as it allowed for a further examination of involvement that occurred during observed instances of play. The case studies each illustrate how the DGEM could be used structure the analyses of specific instances and recurring themes. The model also provided a framework with which to discuss the various forms of player involvement and how these are affected by aspects of the game design and the player themselves. For instance, with respect to *Boom Blox,*

while both participants C and E seemed to pay attention to the instructions (as part of their tactical involvement) they only seemed influence E on an affective level because he found the wording unhelpful when it came time to actualise his tactics. This example also shows how the DGEM can be used to describe negative forms of involvement.

In terms of previous research, the DGEM seems compatible with Malone and colleagues work on intrinsic motivation (Malone, 1981; Malone and Lepper, 1987). For instance, the theory suggests that the element of fantasy is an important element as it allows players to imagine themselves in different contexts through the vivid images provided by the game. This can be interpreted as the way in which the game involves the player on both narrative (by providing a context) and affective (via graphics and audio) levels. In addition, while Egenfeldt-Nielsen et al. (2008) argue that Malone's theory lacks the ability to take the social nature of gaming into account, the DGEM includes a shared involvement frame, while it also emphasises that the frames affect each other as a whole, thus allowing for a greater understanding of how engagement occurs in practice. Though the focus of this study was on single-player play, an example of comes from B playing *Wii Fit,* where the absence of familiar *Miis* led to a reduction of both shared and affective involvement.

6.1.3. The relationship between learning and player involvement

3. Is there an identifiable relationship between the learning that occurs and this experience of involvement?

3.1 Is the metaphor of incorporation useful for considering how these processes relate to each other?

3.2 If not, how else might we be able to describe this relationship?

The findings illustrate that there is indeed a relationship between learning in games and the involvement experienced and one of the main strengths of the DGEM is that is allows for a discussion about how the experiences of involvement and learning relate to each other. When the appropriate frames were internalised successfully (through learning), deeper involvement occurred and incorporation could be achieved (e.g. Participant A during the boss fight in *Mario Galaxy).* It was also interesting to observe when this process was unsuccessful, leading to frustration and boredom (e.g. Participant E during the finals levels he tried in *Boom Blox).* So it seems that the metaphor of incorporation is a useful one when examining successful and unsuccessful informal learning within digital games.

In the instances when frustration occurred, it seemed the player's desired outcomes were not being achieved as they were unable to successfully realise their tactical plans within the performative frame, leading to a negative experience of affective involvement. The player had failed to achieve a sense of incorporation as they had lost "the potential to act meaningfully" (p. 219; Calleja, 2007) within the game world; something which ties in closely with Malone's notion of control (which is dependent on the contingency of the game to the player's actions). Once a player reaches the point where they are so frustrated they decide to give up on the task, any opportunities for further learning are lost.

With respect to successful incorporation, it is worth considering this with respect to the concept of "flow" (Csikszentmihalyi, 1990), as this term could also be used to

account for this sort of experience. There are nine characteristics of flow: a balance between the challenge and skill level, the merging of action and awareness, the existence of clear goals, clear feedback, focused concentration, a sense of control, a loss of self consciousness, a reduced awareness of time and a sense that the activity being engaged in is intrinsically rewarding. Though flow can occur during any activity it has been used to describe aspects of the video game playing experience. However, as Egenfeldt-Nielsen et al. (2008) point out, though the concept of flow might explain why people enjoy playing digital games, it is too general to explain why they choose to play them over any other activity. Though Calleja (2007) argues incorporation can be related to the concept of flow, he points out the terms are not synonymous. He explains that incorporation is dependent on the spatial frame, which something the characteristics of flow do not account for. Therefore, while flow can be used to describe A's experience during the boss fight, it does not account for his internalisation of the spatial frame, as evidenced by his ability to successfully navigate the level whilst attacking the boss.

However, in games like *Guitar Hero III* and *Wii Fit*, there seems to be less of an emphasis on the experience of "inhabiting a virtual environment" (p. 219) as the close alignment between the physical actions of the player and the virtual actions of their avatar seem to lead to a different form of spatial involvement. Does this "physical" sense of involvement satisfy the requirements of incorporation? While the player's actions are still being interpreted as being meaningful within the game, does the player really feel they "inhabit" this environment? It is clear that flow can occur in these circumstances (e.g. when D describes playing a song he is very familiar with – "Sunshine of your love" – in *Guitar Hero* as being on auto-pilot) but this

experience can only occur after he no longer has to pay conscious attention to the required frames. In this case, the spatial frame seems to refer to how the player orientated himself within the environment outside of the game, perhaps leading to a less "immersive" (in the sense of "*traversable space habitation")* but still involving experience (in terms "*deep absorption*").

The findings do indicate a very close relationship between learning and involvement. Further, it seems that it is not so much that involvement is necessary for learning, but that a certain amount of learning is required before being able to experience deeper levels of involvement (e.g. D playing "Sunshine of your love"). The term learning is being used here to describe the learning that needs to occur in order to progress within the game. With relation to educational games however, learning seems to be viewed in mainly in terms of content. Prensky (2006) and de Freitas (2007) for instance, argue that the challenge for designers of educational games is to provide a balance between the engagement experienced and the learning outcomes to be achieved, but this implies that the two are not obviously compatible. In contrast, Pelletier and Martin (2006) recognise that learning and playing in commercial games are essentially part of the same process. The findings of this study support the latter view and indicate that is especially important for players to be able to internalise the relevant frames and see the results of their actions manifest as meaningful consequences within a shared virtual environment they feel they inhabit. The real challenge for educational designers then is how to ensure that the curriculum learning required will lead to the experience of incorporation, though it is less clear whether this experience can be achieved in all types of digital games.

6.2. Limitations and suggestions for future research

Five cases were studied in this project, consisting of five participants and four games, so care needs to be taken when making any generalisations about the findings. Separately, each case study illustrated how the relationship between learning and involvement worked for a specific individual within a specific game. While there do seem to be some commonalities across cases (e.g. the frustration that occurs when player's are unable to actualise their tactics within the performative frame) further larger scale studies are required before any concrete claims can be made concerning the relationship between learning and involvement. It is possible that the relationship may alter depending on the type of game being studied or that it may vary across cultures. However, the amount of data that the method elicits could make large scale studies more difficult. In this research, data collected from the post-play interviews concerning participant conceptions of learning and involvement (included in appendices M to Q), had to be left out as it addressed issues that were beyond the scope of this project. However, this rich data set can be examined in the future, in order to explore the differences between what the player did, how they explained what they did and how they conceptualised their experiences of learning and involvement.

With respect to the application of the DGEM, it was not always clear which frames should be applied to describe certain episodes. For instance, when considering how scoring mechanisms affect individual players, e.g. the star ratings in Guitar Hero and the medals awarded in Boom Blox, it was not clear which of the frames were influencing the player's performative involvement. In order to ensure the application of the DGEM was consistent, Calleja was consulted in order to clarify how the

frames came together with respect to this issue. After a discussion, it was decided that while the desire to improve ones scores was part of macro performative involvement, during the moment of game play the player also has to make tactical decisions about how they will achieve this goal in practice. Further research, where the framework is applied by multiple raters to the same instances, would be useful in helping to establish the reliability of the DGEM.

It is possible that the DGEM could benefit from elaborating on the existing frames. Calleja (2007) argues that some frames could be collapsed so that their constituent parts could be further examined (e.g. having "positioning" as a sub-frame for first-person shooters, which draws upon the spatial, tactical and shared frames to explain what the player pays attention to and how he or she reacts as a result). In addition, the current study indicated that it is not clear whether the metaphor of incorporation can be applied to all digital games. Perhaps the physical involvement experienced when performing "Step aerobics" in *Wii Fit* creates a similar sense of spatial involvement to that experienced when exploring a level on *Super Mario Galaxy*, but the current findings cannot address this. Future studies need to examine whether games like *Wii Fit* and *Guitar Hero* require a different set of overlapping sub-categories to describe the involvement that players experience. These could help clarify the issue of how the spatial aspects of game playing are internalised and whether the games do lead to incorporation, or in fact produce a qualitatively different experience of involvement.

In order to achieve a more detailed understanding of the learning and involvement that occurs during play, further research could establish these categories for other

types of games. For instance, within *Boom Blox*, performative involvement seemed to be affected when there was a problem with the controller, but also when there was difficulty actualising plans produced within the tactical phase. Though both of these issues had an influence on affective involvement, it would have been useful to have a "Controls" and an "Actualisation" subcategory to distinguish between them. Finer grained analyses of play could also be achieved through the use of Activity theory to decompose the actions within the game into activities, actions and operations (Pelletier & Martin, 2008). In addition, the use of eye tracking data might be help corroborate what players say they were paying attention to during the interview with what they were actually looking at during the game.

With respect to the use of games in formal education, it is less clear whether the DGEM can be used to discuss the issue of transfer (i.e. how learning is applied outside of the gaming context) in relation to involvement. Egenfeldt-Nielsen et al. (2008) point out that one of the problems with educational games is the "weak transfer of game experience to other contexts" (p. 218). It is possible that discussing learning in terms of tactical and shared involvement on a macro level will be able to take some of the relevant factors into account but the framework seems less applicable when discussing educational outcomes that are to be measured outside of the game. In this case, further research is required to establish whether the DGEM is a useful framework to apply, and if not whether other factors need to be taken into account e.g. non-diegesis and the role of the teacher (de Freitas & Oliver, 2006). Perhaps the DGEM will be more useful in helping designers of serious games to consider the different ways in which games support both learning and involvement both in the short and long term.

6.3 Conclusion

This study sought to contribute to the area of games and learning by developing a method that could further our understanding of learning and involvement within digital games. A review of the literature suggested that this relationship requires further explanation and indicated there is some confusion surrounding the terms used to describe the experience of involvement; something the DGEM and the metaphor of incorporation aimed to rectify (Calleja, 2007). A method was developed in order to investigate these issues, consisting of an observation of game-play and a cued post-play interview. The DGEM was then applied to the data in order to describe critical instances and themes with respect to how learning and involvement occur in practice. The case studies illustrate how the DGEM was used in five different situations, and the findings indicate that the method can help us to consider this relationship between learning and involvement. Further studies are required though before any concrete generalisations can be made. The metaphor of incorporation does seem to be a useful one to use within this area as it emphasises a much closer relationship between learning and involvement than previous theories suggest. Plus, it also allows for a discussion of how the player affects the game and how the game affects the player. However, further research is required in order to clarify whether the metaphor of incorporation can be applied to all types of games.

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Appendix A: Initial recruitment letter

Do you regularly play the Nintendo Wii? Are you familiar with any of the following games?

1. Super Mario Galaxy
2. Trauma Centre: Second Opinion
3. Boom Blox
4. Lego Indiana Jones
5. Big Brain Academy

If so, would you be interested in taking part in my dissertation project looking at the informal learning that occurs and the feeling of involvement you experience when playing the latest generation of video games? If have played something similar to the games on the list and would still like to take part please do get in touch and I will try and accommodate you.

I am postgraduate student from the Institute of Educational Technology who needs to recruit between 6-8 participants, who will be observed playing a game and then asked a few questions about it afterwards at the OU campus. You will be asked to fill in a short questionnaire about your gaming habits before going on to play one of the games listed above for half an hour. It would be preferable if you have some experience playing your chosen game (but have not completed it) before the observation session. The session will be recorded and immediately followed by an interview which should take no longer than 45 minutes. In the interview we will refer to a DVD recording of game play, which will act as a stimulus for what you were thinking and feeling during the session. This will conclude with some general questions concerning the research topic. All data collected will be treated as confidential while any information that could identify you will be anonymised within written reports. Your choice of tea, coffee or a soft drink will be provided along with some biscuits, during the session.

If you are interested in taking part please send me an email (i.iacovides@open.ac.uk) suggesting when you might be available in the next few weeks.

Your participation would be much appreciated.

Many thanks

Jo Iacovides

Research student
Institute of Educational Technology
The Open University
Milton Keynes

Appendix B: Final recruitment letter

Do you regularly play the Nintendo Wii? Would you be available in the next two weeks to play a game of your choice on campus?

If so, would you be interested in taking part in my dissertation project looking at the informal learning that occurs and the feeling of involvement you experience when playing the latest generation of video games?

I am postgraduate student from the Institute of Educational Technology who needs to recruit between 6-8 participants, who will be observed playing a game and then asked a few questions about it afterwards at the OU campus. You will be asked to fill in a short questionnaire about your gaming habits before going on to play your game for 30 minutes. Ideally, you will have had some experience playing your chosen game (but have not completed it) before the observation session. The session will be recorded and immediately followed by an interview which should take no longer than 45 minutes. In the interview we will refer to a DVD recording of game play, which will act as a stimulus for what you were thinking and feeling during the session. This will conclude with some general questions concerning the research topic. All data collected will be treated as confidential while any information that could identify you will be anonymised within written reports. Your choice of tea, coffee or a soft drink will be provided along with some biscuits, during the session.

If you are interested in taking part please send me an email (i.iacovides@open.ac.uk) suggesting when you might be available.

I would be very grateful of your participation.

Many thanks

Jo Iacovides

Research Student
Institute of Educational Technology
The Open University
Milton Keynes

Appendix C: Consent form

Dear Participant

The main goals of this research are to explore the concepts of informal learning and player involvement within digital games, including any links between the two, and to develop methods for examining the process of game play. The study and findings will be reported in a dissertation while summaries may be published in other forms e.g. journal articles. The study itself includes a short questionnaire, ½ hour of observed game play which will be recorded, and an interview that will last a maximum of 45 minutes. The data collected will be treated as confidential and will only be seen by myself, the lab supervisor and my supervisory team. No information that could lead to your identification will be disclosed in the reports on the project. If at any time you wish to withdraw from the study, you may do so and any identifiable data that has not been used will be removed from further analyses.

If you are happy to take part in this research, please confirm your consent by printing your name and signing below:

Name:	
Signature:	
Date:	

Video recordings will be taken of you as part of the data collection process, if you consent to extracts from these being used to illustrate the research in future presentations such as conferences please fill in the section below.

Signature:	
Date:	

If you have any further questions or concerns please do not hesitate to contact me through email (i.iacovides@open.ac.uk) or telephone (ext. 58848).

Many thanks

Jo Iacovides

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Appendix D: Questionnaire

The questionnaire focuses on your experiences of playing computer and video games. All responses will be anonymised and kept confidential. We ask for your name, only so that we can match the questionnaire to other data collected.

1. Name		
2. Age		
3. Sex	**Male**	**Female**

Circle your response for each question below and please do not leave any blank.

4. What age did you start playing video games?

Under 5	**5-7**	**8-10**	**11-13**	**14-16**	**16-18**	**18 or above**

5. In an average week, how often do you play video games?

Never	**Less than once a week**	**Once a week**	**Several times a week**	**Daily**

6. On average, approximately how long does a gaming session last on a week day?

0 hour	**1 hour**	**2 hours**	**3 hours**	**4 hours**	**5 hours**	**Over 5 hours**

7. On average, how long does a gaming session last on a Saturday or Sunday?

0 hour	**1 hour**	**2 hours**	**3 hours**	**4 hours**	**5 hours**	**Over 5 hours**

8. Do you play any of the following types of games? Please tick yes or no.

		Yes	No
a	**Action e.g. Halo, Grand Theft Auto.**		
b	**Adventure e.g. Legend of Zelda, Lego Star Wars.**		
c	**Fighting e.g. Tekken, Soul Calibur.**		
d	**Puzzle e.g. Boom Blox, Minesweeper.**		
e	**Role Playing games e.g. World of Warcraft, Final Fantasy.**		
f	**Racing games e.g. Gran Turismo, Mario Kart**		
g	**Simulation games e.g. The Sims, Microsoft Flight Simulator.**		
h	**Sports e.g. Championship Manager, Tony Hawks Underground.**		
i	**Strategy e.g. Civilisation, Worms.**		
j	**Rhythm games e.g. Guitar Hero, Patapon.**		

Appendix E: Ericsson & Simon (1993) Instructions

In this study I am interested in what you remember thinking and feeling during the game play session using something called think aloud protocols.

In order to familiarise yourself with this procedure we are going to run through some instructions and practice tasks. First off, I am interested in what you think about when you find the answers to some questions that I am going to ask you to answer. In order to do this I am going to ask you to THINK ALOUD as you work on the problem given. What I mean by think aloud is that I want you to tell me EVERYTHING that you are thinking from the time you first see the question until you give an answer. I would like you to think aloud CONSTANTLY from the time I present each problem until you have given your final answer to the question. I don't want you to try and plan out what you say or try to explain to me what you are saying. Just act as if you are alone in the room speaking to yourself. It is most important that you keep talking. Do you understand what I want you to do?

Good, now we will begin with some practice problems. First, I want you to multiply these two numbers in your head and tell me what you are thinking as you get an answer.

"What is the result of multiplying 24 x 36?"

Good, now I want to see how much you can remember about what you were thinking from the time you read the question until you gave the answer. We are interested in what you can REMEMBER rather than what you think you must have thought. If possible I would like you to tell me about your memories in the sequence in which they occurred while working on the question. Please tell me if you are uncertain about any of your memories. I don't want you to work on solving the problem again, just report all you can remember thinking about when answering the question. Now tell me what you remember.

Good. Now I will give you two more practice problems before we proceed with the main study. This time I want you to answer the question and then I will ask you to report all that you can remember about your thinking. Any questions? Here is your next problem.

"How many windows are there in your parent's house?"

Now tell me all you that you can remember about your thinking.

Good, now here is another practice problem. Please do the same as before; answer the question and then tell me what you remember thinking. There is no need to keep count, I will keep track for you.

"Name 20 animals."

Now tell me all that you can remember about your thinking.

Any questions?

Ok, so now I am going to let you play game x for half and hour and record your actual game play from the TV. Afterwards, during the interview, we will go over this tape and both get a chance to stop it at any episode we think is worth discussing. The tape is to act as a stimulus for the retrospective think aloud procedure, so for each portion we watch I will ask you to report what you remember thinking, and in what sequence if possible, whilst playing. In addition, I would also like you to report any emotions you remember experiencing at the time. Again, I am interested in what you REMEMBER, as opposed to what you think you must have thought or felt.

Any questions?

Ok good. Let's get on with some game play then.

Appendix F: Final instructions

In this study I am interested in what you remember thinking and feeling during the game play session. So while you are playing the game, please pay attention to your thought sequences and any emotions you experience whilst playing. Afterwards, during the interview, we will go over the recording of your play and both get a chance to stop at any episode either of us thinks is worth discussing. The tape serves as a memory cue, so for each portion we watch I will ask you to report what you remember thinking, and in what sequence if possible, whilst playing. In addition, I would also like you to report any emotions, if any; you remember experiencing at the time. I am interested in what you REMEMBER, as opposed to what you think you must have thought or felt. Please also let me know if you are uncertain about any of your memories, including the order in which you thought they occurred.

Any questions?

Good. Ok, I basically want you to spend the next half an hour playing the game as you normally would at home whilst paying attention to what you are thinking and feeling during the process.

Appendix G: Note table for Pilot

Super Mario Galaxy

In order to apply the DGEM framework, I first took notes during both the gaming and interview sessions and then added to these after reviewing the relevant recordings. Once the notes were complete, the analyses consisted of identifying the frames the player seemed to be engaged in (based on their actions within the game and how they explained them) and how these changed as they progressed within the game. This was an iterative process, which was not always straightforward but became easier the more familiar I became with the framework. I also contacted Calleja in order to clarify certain issues (such as how to discuss a game's scoring mechanism in terms of the relevant frames). The application of the framework was refined across all the cases before presenting the results below.

The following table combines the notes and analyses of the observation and interview sessions. The Description column consists of my notes of what the player was doing during the session, where the numbers in the left hand column refer to when the character entered a different area within the game (or started a new level). The Interview section contains my notes of what the player said he was doing during the post-play review of the game play recording. Finally the Notes column contains my interpretation of how DGEM can be used to analyse the events described and the explanations given within the other two columns. The capital letters refer to the frames identified by the model: Performative = P, Tactical = T, Sp = Spatial, Sh = Shared, A = Affective and N = Narrative. T → P refers to the actualisation of tactical involvement within the performative frame.

Time and word constraints mean that I cannot present an analysis of the entire session within my Masters thesis, so I had to decide which incidents and themes were the most pertinent to summarise within the case studies, and these are presented as critical episodes and themes within the case study documents. In usability testing, a critical incident is defined as "an event that has a significant effect, either positive or negative, on user task performance or user satisfaction with the interface" (Gabbard, Hix, Swan, 1999) and this definition was adopted as a guideline for selecting the episodes analyses.

Similarly, usability research also refers to critical threads which are defined as "sets of causally related user episodes that, taken together, define major usability themes" (Koenemann-Belliveau et al., 1994). The emphasis in this study though was on any instances or recurring themes that had an impact on the player's experience. Again, due to space limitations, only a single example from each case could be included within the dissertation itself.

[Note: The writing in black is what I wrote down during the session, while the writing in blue is what I wrote down after reviewing the game play recording and the recording of the interview. This is so I can think about the utility of the method, rather than for analyses, so I can consider how important it is to take notes during the session and during the review. In short, I think it is useful to take notes during the gaming session as while they are less detailed, they help the observer focus on what the player is doing. It seems less useful to take notes during the interview, but they might be a useful back up if anything goes wrong with the recording equipment].

	Description	**Interview**	**Notes**
1	Bookshelf library/engine room area – Observatory grounds Gets a letter from Luigi asking for help but don't know where he is exactly Mushroom gives him a picture and instructions on how to view it Looks at map of observatory, presumably in order to decide where to go next Highlights a new level and then runs off Seems to know where he is going Falls off at one point and has to do part of it again (06.46) Smiles though and then says "this could just be half an hour of me falling off things" (07.02) Manages the second time to get to the next galaxy	Fast forward for a bit I ask him about the 'home bit' and then what he was thinking at this point Says he tried the mushroom guy first as he sometimes gives out 1ups Then checked map for a level he hadn't done Chose a level he hadn't been to before and heads for it Falls of a platform on the way AR points it out, I ask him what happened Says he was "malcoordinated, and fell off" When asked what he was thinking, responds with "darn" Goes on to say that in this part of the game it doesn't really matter as if you fall off, you get put back on Emotions – anticipation, slight annoyance at falling off	a) Seems to be familiar with the controls – P b) Map – T and Sp
2	Browser Jnr. Reactor Lava Reactor Talks to black star in the Observatory and then flies off to new galaxy King Kaliente's Spicy Return Smiles when he sees the title and level Lands on new level (08.25)	Boss level Fight enemy of this galaxy Giggled at King's name (Kaliente) Hadn't been on this level before, not sure what to expect First thing to do is explore a bit From previous levels, knew what to do e.g. need to get a bomb to follow you in order to destroy the domes	a) King's name – A b) Bullet Bills can be seen as evidence of internalisation - T→P c) The way islands are set up

	Almost falls, makes noise but continues Gets rid of Goompas using spins and shooting stars Life gets low though Gets the bombs (Bullet Bills) to follow him and destroys glass cages Gets power ups Likely to have learnt this form an earlier level Explores area for a bomb to lead to final cage with star in it and finds one	Also knew which direction he needed to head in as the way the 'islands' are set up mean you can only navigate them a certain way Saw the gun turret that he needed to go to in order to attract missiles Fails to hit the dome at first but is aware of what needs to be done – "had to try again" Waiting for another one "I knew the procedure from the different levels I'd done previously" Coordination definitely seems to be involved, in order to run between the different islands and not fall off Also if you stand still the bomb can damage you Guide a missile to the dome with star in it at beginning of level – now can move on	– Sp d) Works his way around and gets Bills to follow him successfully – P
3	Flies to new planet covered in lava (10.45) Platforms that sink into lava Keeps accidently touching the lava - Mario jumps up and makes a noise every time he does Being shot at by two melon-spitting enemies (Cosmic bloopers) Gets power up (Red mushroom) life goes from 3 to 6 Keeps getting damaged by blue creatures (Swoopin' Poinks) Tried to spin into them but doesn't work Tries to shoot stars at brown melons Loses life – smiles Pauses and waits to hit green melons which destroy the enemies shooting at him – tongue in cheek Also leads to a new star which he goes to as soon as it is revealed	Flies to next part (36.37) When he first started the level wasn't sure what to do with the sinking platforms – hadn't seen them before Also had no idea about strange blue creatures so decided to ignore them at first Wasn't sure if they were friendly or not "sort of blue and fluffy but then they seem to hurt me every time they touch me" But it was clear what he had come across e.g. meteorite things are dangerous Should avoid them But knows that you can bounce the green ones back at them (thus destroying the Cosmic bloopers) Got frustrated though as when Mario touches the lava "he runs around all manically and it's just a bit frustrating" Once he returns the green melons and destroys the bloopers, a star appears and he goes straight for it Continued to ignore blue things though as didn't know what they were and they hurt him	a) Tries out different ways to deal with blue things – T → P and Sh (new enemies that he is learning about)
4	Reaches the boss – King Kaliente (12:02) Alarm bells sound Bowser Jnr. appears in a ship, says something about King Kaliente being his "ultimate weapon" and leaves King Kaliente appears out of the lave flapping his tentacles while dramatic music plays Starts shooting melons at Super	Boss level (37.44) Nerve wracking because he knew it was a boss and that it wouldn't be easy Thought the sinking platforms would be difficult too – realised he needed to keep moving Sense of anticipation Possibly a similar boss to previous level but AR is unsure about this Didn't know how to approach him at first so just ran around on the platforms	a) Alarm bells and expectations of bosses – A b) Bowser Jnr. – N but doesn't seem very important c) Internalising knowledge about platforms – P c) Trying to work

	Mario Surrounded by sinking platforms which Mario runs around Gets hit by a missile and then lands in lava - dies Dies (shrugs) and then tries again	"trying to keep myself alive" and avoiding the blue things Did notice that King Kaliente would occasionally spit out green things (melons – which he already knows can be returned to the enemy and hurt them) And annoyance when he died but was his first go	out how to attack boss – T b) Already knows bosses are difficult, and about missiles – internalised P
5	Sent back to the start of planet (before boss) Gets mushroom power up Tries to get blue thing again but fails Just goes straight for star after killing melon shooting monsters much quicker this time Burns himself getting to the star though trying to get a golden coin (ignores it after this)	Was a bit frustrated that got sent back to the bit just before the boss (39.32) But at least he now knew what to do Still not sure about the blue things so tested them again to see if they why they were hurtful sometimes – so stood there to see what it would do to him (Mario lost a portion of life) Decided to ignore them from now on Waiting for green balls Accidentally jumped into lava while trying to a gold coin for more life Due to platform sinking Decided to ignore that then and just go to the star and get to the boss	a) Previous attempt meant he now knew what to do and was quicker this time – internalised P, Sp, T heading for Incorporation? b) Tries out strategy on blue thing – T→P
6	Boss fight Seems to realise you have to hit the green balls back to the boss and these will damage him Keeps jumping around Avoids brown melons Starts to try and hit him with a green melon Runs around a lot Stays away from blue things Makes faces as he plays Grabs golden coin Boss gets angry (after a number of successive hits) Seems there are more projectiles now – asteroids? Gets hit once (tuts) Burns himself in the lava once too (smiles) Keeps waiting for the green melons Beats him in the end (17:53) Hit back three in a row Seems quite relieved afterwards (sighs) Says "woo" very quietly and smiles Looks round then goes to collect the Grand star	Boss fight (39.38) Felt more ready for the boss this time but still tense Knew he had to keep moving to stay alive but also has to wait for the green things Didn't know anything else so at this point still exploring his options Saw a green melon and hit it Realised later how to win But at this stage was just waiting for the King to send out green melons Just hitting them whenever he could Trying to work out the rule Can't remember when he realised but he did realise that as soon as he hit a green one back, another seemed to come out Thought maybe he would need to throw them all back in succession So now waiting so he could hit them all back in a row Hit two in a row but missed third – annoying Gauges the King's reaction "next stage of boss" Boss looks angrier than before – "all red and flustery" Interprets it this way on the basis of previous levels as well - get angrier and more difficult In this case there are more meteors flying around Same strategy but now more difficult to avoid being hit (hit once about 41.18)	a) Now knew what to expect – partial internalisation of Sp, Sh, T, P, A and N frames b) Music creates tension – A and knowledge of bosses – N c) Trying to work out strategy, testing out but has to be quick i.e. "see what happens if…" – T → P d) Once he figured it out – Incorporation? e) Gauging bosses reaction to him – Sh (internalised, knows what the reactions means), A (music and graphics) and tells him T → P is working f) Multiple things going on, missiles, sinking platforms, blue things, lava, music etc – demand his full attention

		"See what happens when I hit more in a row" Is a bit nervous at this point Knows what to do, but now there is pressure not to miss any green melons in a row But also wants to keep moving while watching boss Realised there was a pattern to the melons that were coming out - "I knew there was a pattern to the when he *spewed* out because there'd be a round of meteors and then, eventually there'd be some green things" (42:06) Gets annoyed when misses things Lava annoying too cos it makes you lose control for a few seconds – frustrating (loses another portion of life as well) Gets more tense the longer he runs around Relief when he finished the boss But then thinks what if it's just going on the next level of boss? But star came up so just feeling relief – didn't die and doesn't have to fight boss again More relived than pleased it seems Looked around for the star Easier to get to now platforms aren't sinking (43.55) Even more exciting than normal level because this was a galaxy boss and get a grand star from it	g) Recognises pattern to missiles so waits for his chance – T→P h) Relief at end implies he has been concentrating quite intensively during this period d) Is this episode an example of flow or incorporation or both?
7	Automatically transported back to the observatory Big blue ball gets bigger and new path appears in the sky Get some info about the galaxies on the map from Rosalina And see current score Rosalina says need to get more stars and keep helping Saves the game as well Finds out a new world has opened up and goes to find it	Return to the library bit Information Normally get some extra info when you get a grand star Opens up new levels Can see new light streams in the observatory that signifies this Time to explore – more to do Knows what messages are going to say Bit frustrating that can't fast forward these bits Can read it quicker than it scrolls Rosalina repeats herself Saves game Automatically, knew it was going to happen Didn't want to lose place if something happened	a) Knows he will get some more story but isn't that interested since would rather fast forward, finds it repetitive – N b) Saves game – doesn't want to lose his place – N (personal)

8	Heads towards Engine room (where last galaxy was) but this time has to use the moving yellow platform to reach the steps beyond it Pauses outside the Gate but continues upwards to the Garden Garden galaxy – carries straight on	Decides to explore a new galaxy Remembered moving platforms – figured they would help him get to new bit Steps make it obvious you can proceed Seems confused by the gate area, as supposed to go the garden Paused but carried on Decided to continue to new galaxy though Slightly confused by the garden as usually enter a little room – but just goes straight for the star	a) New area opens up - Sp b) Decides to explore – Sp (macro) c) Confused by garden as it appears different to other gateways to new levels – conflicts with internalised knowledge Sp + P
9	Deep dark galaxy revealed Flies to Underground ghost ship planet One he hasn't been to before Lands (21.47) Talks to a Toad (friendly) who says they are on some sort of survey duty/vacation Explores the area Finds some star bits under a rock Don't think he's come across the sea crabs as he doesn't seem to know how to kill them Tries shooting them with star bits (from various angles) and doing a 'ground pound' (jump and then smash to the ground) Eventually spins in to one of them and that works	New level in Deep Dark Galaxy (47.14) Lands on beach Figured from the torches by the door (previous levels) he would need to turn into fire Mario – saw these straight away Normally good idea to talk to people that are around in case they have instructions for you AR says you can tell pretty quick whether they have anything useful to say to you or not Crabs are new enemies – not sure what to do Decides to try and fire star bits at them, also jumping on them (loses a bit of life) Neither worked so come back later Explores the area Gets star bits, coin (which restored one portion of life) Continues to try and attack crabs Notices that when they crouch their backs are exposed Spins into one of them from behind and kills him Maybe use the green things to kill monsters?	a) Saw the torches and knew what he needed to find – internalised P also has to explore to do so – T→P b) Talk to other characters to find out info – Sh + T c) Crabs as new enemies so tried out different ways to fight them – Sh + T→P
10	Uses cannon and aims for a crowded rock in the sky Sees lots of monsters (Goompas) and runs away from them (says "oh dear") The sees a star and goes for straight for it	Gets in cannon Looks around but aims for more obvious planet (other one is behind a palm tree) Annoyed that he missed grabbing a star along the way but thought he could get it later anyway In the replay, AR sees the fire flower but points out at this stage he hadn't seen it Instead just wanted to avoid all the monsters so headed towards the top of the rock and the star he could use to get off it	a) Seems familiar with cannon – internalised P b) Desire to avoid monsters overrode desire to explore, made a choice which cost him – T→P

11	Flies back to the beach Runs after something leaving footprints in the sand Tries to kill it with a ground pound Still tries to shoot crabs with star bits Collects more star bits after spinning into rocks on the beach Toad makes noises and tells him to get into the cannon	Thought if he killed the invisible one something would be unlocked Actually describes it as being under the ground Says he had no idea what it was Followed him and waited for him to pop up Runs around Thinks that maybe he needs to do something underwater before using the cannon again	a) Trying out different strategies that might lead to game progress – T→P
12	Goes back to cannon aims for the other rock in the sky (behind the tree) Lands (24:17) Spins into Goompa, collects bits Unscrews something which releases series of coins that he tries to collect Tick-tock sound of a timer World is shrinking – can't reach the coins (say's "oh dear") Falls off it on the previous rock (along with 2 Goompas) Collects coins and then end up on crowded rock Goes straight for star again and flies back to the beach	Back in cannon (49.50) Aims for the other planet Says he did see it first time around, but thought he would head for the other as there wasn't a tree in the way Saw the screw top, and from previous experience knew that something would happen once he unscrewed it though not sure what Didn't realise straight away that the world was shrinking Thought it just made the gold coins appear Did hear the ticking though and wondered whether coins would disappear once it stopped But then once he couldn't reach coins he figured out the planet was getting smaller Initially thought coins were moving away from the planet Landed on other planet with pink monsters but got off it very quick as he knew how to	a) Trying out different strategies that might lead to game progress – T→P b) Knew about the screw – internalised P c) But surprised by shrinking planet – internalising new P d) Tick-tock noise – A e) Again, chooses to avoid monsters rather than explore – T→P
13	Beach Runs after footprint guy again for a while, trying to catch him (pounding, star bits etc) Chases him along the shore	Lands on beach again Sees footprints again and gets a glimpse of the invisible guy but he disappeared again Thought a green melon might be useful to get him but are quite difficult to direct Gave up after chasing him for a bit	a) Trying out different strategies that might lead to game progress – T→P
14	Then goes swimming Finds green shell, seems to be a torch and help with swimming Goes underwater with shell Finds 'treasure' – extra life Goes back to beach	Nowhere obvious to go so goes swimming Explores the ocean Saw the shell and had some prior knowledge for what is what for e.g. using it as a missile underwater Saw something in the corner so went for it Chest with 1UP – seemed useful But no indication that had to break through a wall or something to access the other part of the island	a) Trying out different strategies that might lead to game progress – T→P b) Shells – internalised P

15	Beach Runs around again, heads towards the gate with stone pedestals Spins into red crab gets more star bits Runs to other side and goes swimming again Heads back and kills another crab Follows invisible guy again (occasionally something seems to appear but only for a flash)	Was sure about whether there was anything useful in the water by the other side Got distracted by a crab along the way Saw the pedestals again, so knew he needed to becoming flame Mario but at this point still didn't know how to achieve this So explored the other bit of water but didn't really find anything Distracted by the invisible guy as well Tried to stand still to see what would happen Couldn't figure it out though	a) Trying out different strategies that might lead to game progress – T→P b) Starting to try the same things again – having trouble with T
16	Goes back to cannon (27:40) Aims for turret Hits wall but lands in water Both AR and me laugh	As a result goes into the cannon again Aims for a turret Hits the wall and slides down – no damage though Explains it as a "moment of madness"	a) Resorting to unlikely strategies now – T b) I laugh too – Sh
17	Back on the beach Kills green crab and gets a 1UP Kicks melon around for a bit – possibly trying to catch invisible guy? Tries to click on sun bed but nothing happens	Runs around beach Knew the blue crabs had 1Ups in them so goes after one and gets his extra life Chases invisible guy a little but too difficult Tries to talk to something on a sun bed but doesn't seem to work	a) Starting to try the same things again – having trouble with T
18	Cannon Aims past turret Flies off into the distance and dies "Oh well" Seems stuck Asks me how much time we have left About 5 mins Back on beach Runs around Kicks melon for a bit – into the sea Collects more star bits from rocks Kills green crab and gets another one up Collects more star bits from rocks	Goes back to cannon in case he missed something Dies after firing himself into space Seems slightly embarrassed because he lost a life but says at least he learned something from trying it Usually it's quite obvious where you are supposed to go At this point he'd explored the beach and water a lot so figured he probably needed to have another look at the planets he'd already been too Looks for a power up to compensate for this – goes for crab	a) Internalising knowledge about what Mario can do, learnt something from – T→P b) Decides to explore previous areas again – T, Sp
19	Jumps into cannon again Aims for shrinking world Lands (29:50) Gets Goompa and star bits Pounds what looks like a tree stump but nothing happens Gets the other Goompa and star bits Seems to be exploring, Goes back to screw and unscrews it again Collects coins and just manages to get enough to get a 1UP World shrinking again and timer (tongue in cheek)	Goes back to green planet Explores again before he unscrews it so see if there is anything he missed Couldn't find anything so unscrews it and gets enough gold coins for an extra life	a) Starting to try the same things again – having trouble with T→P b) In the meantime might as well power up – P

20	Falls on crowded world Seems to notice something and he runs over to it Finds the fire flower ("Ah") Uses a combination of star bits, spins and fire on the pink Goompas but there seem to be too many and they are throwing missiles at him so he dies Smiles and sort of nods End of session (31: 24) I ask if he's ok with stopping there and he says ok	Lands on pink monster planet Finally sees flower and though he dies knows what to do now, seemed eager to get back to the game Tried to kill as many as he could once he got the plant but he was surrounded Couldn't move and kept getting pelted by rocks so died But says "At least this time I felt, it's alright, I know what I need to aim for now so if I was going to continue I would..." and says what he would do next	a) Finally finds what he is looking for – P b) But monsters outnumber him – P c) Ok though because he now knows what to do, even thinking about it during the interview – T

Appendix H: Note table for Case 1

Wii Fit

	Description	Interview	Notes
1	Plans to do what she normally does Is a fitness program so does have some sort of routine Normally does the body test i.e. measures weight etc But didn't want to this time Managed to copy the saved game data but unfortunately don't have the same Miis Not her own, or those of family members and friends Need to save them on a Wii mote? First off means that her one doesn't look like her But also means the other Miis who she interacts with won't look the same Her son has put a lot of friends and family on the game	We are a bit pressed for time because of the delay but decide to run through it (51.43) As we were waiting she started to tell me about how the game differed from when she plays it normally at home Tells me about the experience generally Felt quite different to usual e.g. sometimes does jogging, and on the way you pass people you know Because her son has put dozens of Miis of all sorts of people Also your Mii looks like you so when you're dressed in a penguin suit it looks like you in a penguin suit Makes the experience different Usually, she does do the body weight test but felt a bit uncomfortable doing it in the lab Mentions that the Wii can be a bit 'preachy' to you Gives you tips, tells you stuff Asks about how Maria looks Encourages you to pay attention Tries to extend the experience e.g. tell someone else if they look thinner, reminds you of other's birthdays Attempts to encourage and motivate you through extended network of friends and family Normally familiar with the Mii around you	a) Not comfortable doing body test – Sh b) Couldn't load Miis, her own and others – P (doesn't identify with her own), Sh, reducing A c) Wii as "preachy" – Sh but also in a good way as tries to extend the experience to other members
2	Aerobic exercise (11.05) Step class "Step on and off the Wii Balance Board in time to the rhythm to burn off calories" Stands in a row with other Miis while the screen displays the steps she has to take and in what sequence on and off the balance board First thing she says "You see, I don't know these people" Seems to do pretty well – lots of perfects and okays Different feet patterns and colours depending on the sequence Pink = step on Green = kick foot Blue = step to the side	Aerobics class First reaction in the aerobics class concerned the fact that she didn't 'know' the other Miis Usually there are 2 ppl that she knew (and who use Wii Fit), and all Miis would be the ones her son created They turn round and smile in encouragement when she gets a number of perfects in a row Feels encouraged by it Imagines this is a bit like what happens in a real aerobics class Expected them to do so even know she didn't know these Miis "They obviously knew they were strangers, they didn't turn round and smile" (56.29) Felt different	a) First person view essentially – P b) Doesn't know other Miis – Sh, A, P (cos they encourage you) c) Previously internalised assumption about Miis not met – Sh that affects A d) Has to step where screen tells her – closely aligned P, T and Sp e) Seems to get most of the steps

	Purple = side step on the board Arrows = step off Timing seems important Music speeds up – "lets go faster" (13.59) Claps her hands to her side in time with music, which instructor asks you to do Finishes, looks at score and rank briefly (15.27) 615 points, 3 stars Plays again it but first tells me how it is different to when she plays at home She knows the other Miis and they turn round and smile at her when she does well – after a certain number of "Perfect" steps Give her encouragement Finds herself sometimes talking to them Interaction feels different – I say we'll follow this up in the interview later Normally tries again so redoes the step aerobics class Again, gets a lot of perfects and okays When she misses a couple of the side steps (purple) she mutters something (18.30) When you miss a step the sound seems to reflect that – drops out Does seem to be dancing a bit Speeds up again and she seems to get the steps right this time Score (20.30) Doesn't seem pleased with the score though – shakes her head and says shit Tells her how many perfects, OKs and Misses and gives a total score 591 points, 3 stars Then shows you if you have a place in the top ten rankings Game tells her how many minutes of exercise she's done up to this point – puts the 'time' in a piggy bank of some sort Has collected 10 minutes so far	Usually does the class twice as well, though this time she points out, Thinks she did worse the second time around Usually in the morning, still waking up first time, so does it again Mentions the fact that the Wii board doesn't always register the steps you make – how she accounts for when some steps were missed Annoys you when this happens Says happened more in the lab than at home – possible that she just wasn't as comfortable Clapping – says she would probably do that a bit more at home, idea that it helps burn up more calories Doesn't do all of it but does some Felt less engaged because of the whole Mii thing Mii at home – wears purple and black, black hair like I do, glasses like I do, broader than all the other on there! Score board Says she pays attention to it Especially the number of misses in this case Ideal would be to never miss any and get all perfect She knows from previous experience that the score she got (615) is unlikely to rank – she was right Ranks them according to everyone's scores but for aerobics class she is the one who uses it most so has all the top scores Says she does it twice as by the second time she has usually woken up Says she does have to concentrate – trying to get perfects every single time (which she's never managed) (59.50) We talk about motivation and how when you know you're not going to get a better score there is the urge to give up and stop playing Watching one of her family play it – he will bail out when he knows he won't beat his best score rather than keep playing Whereas she sees it through, thinks of it as exercise Purple side steps Not so good at registering them If you miss a lot of them, it will give you a chance to get back into the routine by slowing down Thinks "shit" when misses on Not able to redeem it if you're not doing very well – less incentive to keep going	during the class – internalised Sp, P e) Board doesn't always register steps though – P controls in lab, or maybe not as comfortable Sh? f) Music speeds up, as does routine – A, P + T g) Usual routine to do it twice – N personal h) Claps to burn off calories – P but less so here cos Mii issue made her feel less engaged – Sh i) Pays attention to score – P, N personal, not pleased with it on second attempt (Shit) – P j) But also ranking – P, Sh k) Has to concentrate to get perfects – T→P l) Importance of scores, if you know you are doing badly – P then can be demotivating – A m) But this is exercise, so keeps going – longer term P? n) Unlike family member who quits, cos main motivation is score – P o) Game responds to your performance, makes it easier if you're having trouble – adjusts T + P p) Importance of timing, focuses concentration – closely aligned T and P q) But not very exciting, even less

		Timing seems quite important with this class Forces you to concentrate on what you're doing Says that is it boring though – even more boring when you don't do as well But she likes the way it randomises the Miis so you get different ones in the class Suggests they have modelled it on a real aerobics class where someone you know is likely to turn around and smile at you when you are doing well	so when doing badly – internalised steps (Sp, T/P) so routine, doing well (P) adds incentive r) As do Miis – Sh
3	Quits goes back to Aerobic exercises Chooses Hula hoop "Sway your hips to spin the hula hoop. This can help improve pelvic alignment" (21.05) Again points out how the Mii looks nothing like her – shakes her head and laughs "Who are these people?" Game counts the number of times you spin Timer countdown as well from 65 – gets quite loud towards the end Also have to lean to one side in order to 'catch' the hoops thrown at you Still have to swivel your hips though Seems to be quite a lot of hula hoops She misses one, laughs, but catches the rest When it finishes, we see the score and ranking again Gets two stars (out of four) Doesn't rank in the top ten 12 mins now She pauses for a while and then decides to do something else Quits	Hula hoop task Did some of this last night and the other two Miis were family members Later on the game is less clear which one is going to throw the hoop at her – annoyed with that! Like teasing you with them Says that when she plays it at home she sometimes gets angry at the other Miis when they throw hula hoops at her Invests them with the personality they are supposed to represent Seems like she always checks her score and ranking Does pay attention to these, with later task actually checks to see who got the higher score	a) At home gets annoyed with Miis as if they really were family members – A, Sh b) Doesn't recognise Miis – Sh, A c) Does pay attention to rank and score – P, Sh, N (personal)
4	Leaves aerobic exercises Chooses Balance games Table Tilt (23.10) "Lean your body left, right, forward and backwards to tilt the balls into the holes" Have to get marbles into the hole by balancing on the board Starts with one ball but gets progressively more complicated with extra balls Seems quite tricky Some balls fall off – put back on after though with no obvious	Balance games Says she consistently scores at 40 – if you look at her scores – but this time got to 5 Likes having these games together Do something strenuous like step or jogging Require more control than activity Require a combination of concentration and control Timer can lead to more stress – worried the ball will go over Have to move very small amounts to do it well	a) This requires more control than activity – concentration (T + P) and control (P) b) Timer adds to tension – A c) Don't want to lose the balls – P d) Subtle movements – T e) Balls with Miis faces – Sh talks to them like family –

	penalty but you do lose some time Makes frustrated noises The timer seems to contribute to a feeling of tension e.g. says "Oh shit" when she hears the 10 second countdown (24.08) And the music seems to add to this Reaches level for but runs out of time Shakes head Score 30 points (10 for each level cleared) – 3 stars Doesn't rank 14 mins Retries after running out of time Seems to do better this time Gain time on each level the faster you do it Balls have faces of Miis on them Balls often teeter on the edge of the board Seems quite frustrating Very concentrated Reaches level 5 – three balls platform seems a very tricky shape Level 6 – 4 balls one hole Struggles to get last two in – runs out of time "Aahh!" Score Laughs 50 points 2 stars Ranks second seems pleased 17 minutes Quits (28.17)	Even the balls have Mii faces on them – seems at home she will call them by their names "actually engage with who it is, it's sort of like your mum who is being awkward and not going in" (1.06.18) Disappointed with first score, but feels better about second one As you go through the games unlocks other games and more levels Beginner, intermediate etc Can cause conflict at home e.g. penguin game and her son Level six is the furthest she's got Difficult shape More an individual game though, little opportunity for multi player play Bit disappointed that didn't get through level 6 But reasonably happy with score – quite high up on the rankings, though far away from the top score (99)	A f) Tries task twice – disappointed with first score but pleased with second, especially rank – P, A, Sh g) Competition at home with other family members – Sh, though little multi player play
5	Stays in balance games Pauses over Bubble one but chooses penguin slide Penguin slide "Shift your body rapidly to the left and right to tilt the iceberg and feed the penguin" (28.38) Have to balance on the iceberg to catch as many fish as possible Looks difficult! Smiles a lot whilst doing task Timer countdown as well Falls off quite a lot but seems to catch a fair amount including some 10pt fish Penguin jumps right on after falling off Seems to fall off pretty consistently Again, presented with score and rank 52 points two stars	Penguin task Says she looks quite funny in a penguin suit Though the current Mii does too "This person" as opposed to me Says she's not very good at it Especially this time All about sliding down but not sliding too far to get the big red fish which is worth 10 points Trying to get the fish with more points Importance of timing again Laughs and says that while she knows it makes little impact on the game she can't help flapping her own arms while she plays (1.09.44) One of the most "unsophisticated video games" laughing Reckons the younger ones just conserve their energy better At the end the penguin flaps its wings as a sign she has done well	a) Doesn't identify the Mii as herself, third person view now – P, A b) Similar to tilt task – coordination of concentration and control, importance of timing – closely aligned T and P c) Penguin reaction – A d) Can score ok individually, but not rank well – P, N personal, Sh

	Ranked 9th Checks other ranings 19 minutes Quits	If she hasn't done well just flops forward Points out that she may have done well in relation to her own previous scores but that in relation to other people's scores she has not ranked well She checked the ranking and only scored 9th	
6	Stays in balance games Ski slalom "Lean left and right to ski down the slalom course" Beginner difficulty (31.15) Have to ski quickly between different flags, colour coordinated You get information about your centre of gravity Game tells you to keep within the blued band of the CG monitor Leans forward quite low on the balance board Misses a couple but completes course Tells you how many you miss too Score rank Gives you a time based on how long it took plus extra for any flags you missed Three stars Ranks second – smiles 20 minutes Tries again Pass through most of the flags Sighs when she misses one Score Slightly better this time Three stars Ranks second Replaces previous score Nods 21 minutes Quits	Skiing Balance and speed If she goes too fast she will miss too many flags Again does it twice because she thought she could do it better Isn't sure she did though, maybe a little bit Mentions the importance of sound effects – feel like you've collided with the flag Did do marginally better	a) Requires balance and speed – closely aligned P, T, Sp b) Get extra info about centre of gravity – helps with T→P c) Through she could do better so did it twice – P d) Did a bit better – P
7	Stays in balance games Chooses Balance bubble (33.46) "Guide your Mii safely down the river by leaning to the left right front and back" Beginner Have to guide bubble down a river Shift weight to move it Hits the side pretty much straight away Failed - "Shit" Laughs at score - one star 116 metres Doesn't rank or get minutes Tries again Short clip at the beginning shows	Bubble task Very frustrating Can go further, in fact did last night Seems very sensitive A lot of the balance ones are Normally gets half way down the course but this time didn't Fails it and gives up though point out she has done better	a) Tried it three times but didn't get very far, frustrating so gives up – T, Sp, not → P, affects A b) Has done it before and done a bit better but didn't this time – not internalised the frames that well yet

	you how you're supposed to balance Timer counts down as well Gets further up but bursts bubble again Failed Score – 230 metres, one star, no rank Tries again Seem to have to lean forward slightly to keep the bubble going forward Almost avoids the bend but bursts the bubble again Laughs Failed Score 229 m, one star, no rank No minutes added this time Quits		
8	Goes back to Aerobics again Rhythm boxing (35.43) "Throw punches in time to the rhythm. This workout will help you burn your body fat" Advanced Picks up nun-chuck and attaches it to Wii mote Asks about whether we have enough time for her to do this one (supposed to take 6 mins) Says something about her aggression Game tells her if her timing is perfect she will get double points Demo of the moves and sequence she is supposed to perform Then her turn However, immediately there seems to be a problem with the Wii mote and nun-chuck as they don't seem to be responding "I'm not getting any hits on it at all" Checks the connection but nothing seems obviously wrong Keeps trying After a while some of the punches seem to land Timing seems to be an issue Seems to improve the longer she does it Patterns grow more difficult Have to jump on and off balance board as well On one occasion she seems to ignore the pattern completely Seems to lose track (38.39) Doesn't carry out the end of the pattern Sighs and mutter something	Boxing (1.12.40) Now at the advanced level Hasn't done this one in a while Trainer seems such a grump especially in comparison to yoga one – all very understanding Not very encouraging really – you didn't do well enough! Controllers didn't seem to work at first Possibly the nun-chuck wasn't connected properly Or just being in a different environment Start thinking is it working or not? Took a little while but did start too work Didn't work as well as at home Get flashes when you hit at the right time, at first isn't getting any of these Usually, she gets the double point hits as she times them right Then get red and yellow flash Normally gets half of these Importance of timing Seems frustrated with her performance as knows she can do better Quite physical Sequences get longer – don't always pay attention Says her mind wanders, but then it often does Will only realise once she's done rubbish at something Bonus time seems her favourite bit Explains that if you hit the punch bag hard enough it will eventually explode Doesn't always – need to hit it hard enough Says it quite nice to get to this bit Didn't realise at first but quite excited when they did	a) Advanced level – implies she is very familiar with it, internalisation of frames b) Trainers personality – Sh, A c) Issue with controller – P, Sp or was it the lab setting – Sh? Eventually starting to work but not as well as at home – A d) Can tell cos usually gets more double points and flashes – P, A, less satisfying e) Importance of timing – T and P aligned f) but if controls not registering will affect A, make it less enjoyable g) Sequences get longer and more complicated as session progress – more intensive – P h) Seemed to lose track during the session occasionally – P, getting bored with task, due to lack of double points – P affecting A i) Reacts to trainers

	Gets next pattern though Simulates the pattern while the coach explains it Smiles when the trainer makes some sort of comment about feeling the fat burning away Patterns that you have to copy grow increasingly complex No timer One pattern involves weaving from side to side (42.33) Says "shit", shakes head Says something about tripping laughs (almost tripped on the board) Tries the first weave, then gives up on two of them, then tries again Looks like she got hit once Bonus time (43.50) "Throw your punches any way you want to" Timer counts down from 15 seconds Seems excited to be able to just let go and throw lots of punches Gets a lot in there but doesn't exactly go for "the knockout" as trainer suggests Takes a deep breath after she finishes Trainer then says she can do better and they should work on it tomorrow "That's what you always say" she responds Again get score and rank 530 pints, 2 stars Ranks second I ask if she wants me to save her progress, she says no	Especially because the trainer is so grumpy Will probably never tell her she's done well Expression of coach looks pretty serious Coaches see to have specific personalities In yoga one can choose male or female, though both probably more 'yoga types' Star ratings are described in different ways depending on what task you complete E.g. in this case with 2 stars was "Simmering fire" In something else might have been "amateur" Likes these little things you can discover even if you've been playing the game for a while Bonus time – any energy left use it up I just want to hit him heard enough so he will explode Coach still serious looking	comments – Sh, A j) Weaving pattern – have to orientate yourself spatially on the board as well to affect the game – Sp, P k) Really enjoys the bit at the end where she can just let loosed on the punch bag – no patterns, and can take out her dislike of the coach – P, A, Sh, wants it to explode – A m) Reacts to coach when he says you can do better – Sh, A n) Yoga coach much more calming – A, Sh o) Points out the star ratings have names – P, A p) Doesn't want to save progress, thinks she can do better? – P

Appendix I: Note table for Case 2

Boom Blox (1)

	Description	Interview	Notes
1	Goes to menu Selects his profile – Beaver Looks at options for a while Selects Play Chooses adventure eventually Looks at Gem Kingdom But goes back Chooses Adventure Challenge Medieval But everything looks locked Goes to Explore Looks at the options But goes back Goes back to Adventure again	Profile name = Tatty "Tatty head" Menu screen Took some time looking at the options Explains that there are two types of option: Adventure with story line against the clock General games with their own subsets Picked the adventure one Watched his partner play it recently so thought he'd have a go at it Says he didn't find it particularly enjoyable First time he played it though Took a while going over the options because he wasn't sure where to find it Watches the cut scenes Though thinking that he isn't particularly interested in it Reckons it's well done though Good for younger players perhaps but lacks real relevance	a) Hasn't internalised game options, for adventure mode at least – Sp b) Didn't enjoy adv. mode that much – A c) But hasn't played it – hasn't internalised the frames yet d) Watches the cut scenes but not very interested, cos not very relevant – A e) graphics and story might appeal to younger players though – A
2	Chooses the Gem Kingdom Sneaky Thieves Watches the cut scene Bear (Grrs) vs. Sheep (Bahs) Picks Final Siege Seems to read out the instructions Has to defend the gems from the invading bears Looks around the area Rotates the camera angle In top right corner shows the number of attackers Starts throwing balls at the bears Knocking down towers in the process Says he is trying to remember how the controls work Keeps rotating the camera till he knocks down all the bears A few of his gems do get stolen Says he thinks he is going to lose but he doesn't Wins, gets silver – seems relieved Says he needed to do a lot of quick thinking for that one Unlocked some new bits Iron chicken For puzzle editor New level	Gem Kingdom – Final Siege (43.17) Monsters/bears attacking from all over Different type of game than what he has played though Thought he'd have more time to spin round and work out what he needed to do But had to deal with all these bears straight away Had to switch his brain on quickly Thought it was more like a puzzle, similar to what else he's played on Boom Blox But actually needs to shoot at the bad guys "Totally confused" to begin with Didn't realise the bears were stealing his gems till the end Said maybe he should have read the instructions Says though "but I got silver" Despite his confusion Found the controller was a bit difficult sometimes Seems to lose track of where it's pointing	a) Wanted more time to take stock – to internalise Sp and T b) Attacked straight away – T and P closely aligned c) Previous knowledge interfered with performance – internalised Sp affected T + P d) Trying to remember controls, and had some issues with controller – P and Sp e) Should have read instructions – T (though he did seem to) f) Despite confusion got silver – T→P g) Pleased with

			silver – P g) Confused as too much to internalise – little sense of incorporation
3	All completed Goes back to Gem Kingdom Has unlocked Warriors Chooses this one Another cut scene which he watches Says he isn't sure this game needs a story though I say we will talk about that later in the interview Says it gets in the way but thinks it's nicely done I say he can skip it, he doesn't seem to want to Cartoon style that might appeal to kids more Laughs at the bit where the sheep gets rid of the monkey guard (07.30) Selects Fight back from option screen (only option available) Sheep vs. Monkeys Reads out instructions (08.10) Has to use bomb balls Can be done in one throw Doesn't do anything straight away, looks like he's just aiming the Wiimote at the screen Losing sheep Throws at one of the towers, which knocks into the others Gets all 10 gems Talks out loud to himself - I was rushed though, I just threw it Gets a gold medal Says that he thought he would be able to move the camera angle but he couldn't Unlocks something for create mode And new level	Next Stage = Warriors Cut scenes "awfully cute", "quite fun" Seem to make him smile Fight back (46.00) On to a different one – still blasting but wasn't sure at first Concerned about his sheep – "had to get in there as quickly as possible" Just throwing things – hit the middle one Did get gold though Though reckons it was more luck than judgement	a) Cut scenes cute but unnecessary – A b) Blasting – T but still trying to internalise frames c) Concern over sheep dying – A d) Just throwing – no real T, just reacting P e) Pleased to get gold but luck – P, sense of agency (not in his control)
4	Unlocks new stage Collateral which he plays Gets a view of the setting just before the instruction Mentions that there are bomb blocks Reads out instructions to himself – notes that it can be done in 2 throws (09.00) Looks around Loses a lot of his sheep while doing so Throws at the main block Gets most of the gems (14/16) Gets rid of enemy troops Then throws at the left bomb block Gets the enemy army But it also looks like he gets some of	Collateral (47.04) Says it's a bit more interesting as it's a bit puzzle though (46.00) Recognises the red boxes from previous games But says they can be a bit of a decoy sometimes Worked this out from previous experience Don't always need to use them Does pay attention to the ratings at the end Got bronze just now and played again straight away Still got bronze though Keeps wanting the gold (47.55) But not like this will all games he	a) Recognises bomb blocks but knows they aren't always necessary – internalised P b) Looks around – Sp and T but as a result loses sheep – P c) Starts attacking but uses several throws so gets bronze – T→P d) Not the result he wanted so tries again – P e) (ii) Read

	his own sheep No gems Aims directly at one of the gems and throws Gets it But doesn't get the last one Seems annoyed Says it got stuck Aims for it and gets it Gets bronze medal Wins some sort of prize though Says he wants to try it again (ii) Reads out instructions – focus on the bomb blocks (9.48) Aims straight for the left hand bomb block this time Throws His sheep are getting killed Only gets 1 gem Aims for central block Gets bombs Gets enemies And lots of gems Says there's still three left Aims for final bomb block on right Get one gem Aims for wall on the left Gets last two One sheep late Says he wonders if the bomb blocks are actually distracting Bronze again Unlocks something	plays – usually just achieves what he needs to, it's usually enough In this one though he wants the gold, to be able to do it in one throw (ii) Still watching the replay of his second attempt Seem to be thinking about strategy for his next attempt Says "that's where I'm thinking these bomb blocks aren't particularly useful, there might be another way around it" If he was playing on his own, might have kept trying till he figured it out	instructions – T d) Aims for blocks this time – different T e) But still not as successful as he would like (bronze) – T not → P f) Reckons bombs might be distracting – T g) Would have kept trying if on his own – Sh
5	Goes on to the next level Bluster(10.48) Reads instructions – needs to aim for the weak parts Looks at the screen Aims for left hand purple block Vanishes when you hit it Gets 8 gems Aims for middle purple block Gets gems Aims for right hand purple block Gets gems Aims for purple block in the middle at the back Gets gems Aims for last gem on the right hand block Gets it Scans the screen Says I don't like not being able to move the map Waves Wiimote around Wins Gets a bronze Unlocks something	Third round = Bluster (48.55) Possible in three throws Some sort of chain reaction is implied by the set up of the blocks But "where do you start?" He doesn't have time to think about it as he has to immediately react to what's going on Have to rush to react in order to stop sheep getting killed, in order to not get beaten Bronze Feels like what he's doing is having a quick go and focusing more on the blocks than what's happening to his sheep at first Thinking through the possible solutions	a) Instructions - T b) Recognises need for chain reaction from set up – Sp + T c) But not sure how it would work – T→P d) No time to think – T + P closely aligned, sheep getting killed – A e) Gets bronze – P f) This is a first attempt, next time… - T (macro)

6	Unlocks next level Iron gates Which he clicks on I tell him that I'm happy for him to talk out loud if that's what he normally does but he doesn't have to explain anything to me He says he usually talk to himself anyway But doesn't read the instructions out loud this time Waves the Wiimote around Doesn't make any throws Army defeated Decides to stop what he's playing Says he wasn't enjoying it His army is defeated Says he doesn't have enough time to work out how to approach the level	Next level = Iron Gates (50.00) Too difficult to just step in and know the solution straight away Have to be really quick Says "look at the complexity of the level…" Did try and have a look around but he couldn't use this command in this level Ended up losing all sheep pretty much straight away	a) I mention he is talking to himself, seems to stop doing it for a little while – Sh b) Doesn't throw at all – no P c) Not enough time to work out a solution, too complex – couldn't internalise Sp, T + P d) Tried to look around but couldn't – Sp e) Lost all sheep, and not enjoying it now – P
7	Goes back to the main menu into Explore mode Says that was the adventure stuff which he isn't too keen on Selects Grab tool (i) Then Simple Push (12.41) Looks like giant Jenga but there is are cows on top Pauses over instructions Allowed to take a look round before you play the level Says ok uses the Wiimote to rotate around the blocks Presses play and you can hear a timer tick – counting down from 1.40 Still looks around a bit first before he pulls the first block Then starts pulling blocks out Mostly middle, larger ones Get one point for each block you remove successfully Lose points if you knock any others out by accident Can't see how many points he has Pulls one and loads come down – loses Says oops All baby cows are lost – says "baby cows" and smiles (ii) Tries again (14.05) Music plays with weird cow (?) noises playing occasionally Doesn't use time to look around at all – goes straight in Looks around though while timer is counting down Starts with smaller blocks this time which are nearer the top Works downwards Then goes for bigger ones nearer the	Decided to try something else Wanted to do something where he could "spin around and I could take my time working out" Finds it more enjoyable Play → Explore mode Grab Tool (i) Chooses Simple Push (50.51) Unlocked but hasn't tried it before I say it looks like 'giant jenga" But says he isn't too keen on the pulling blocks thing because the movement you make doesn't always map on perfectly Mechanic doesn't seem to work too well, sometimes flip blocks above the one your pulling without meaning to (ii) Said his thinking didn't start out quite right on this attempt Thought he would just start pulling as many blocks as possible Actually, on his second go realised he needed to get the cows to come down by pulling the blocks out from directly underneath them Otherwise will never get enough Structure came toppling down, Failed the level Said he felt sad about dropping the cows Tries again Different approach? Unsure at first Knows that he tried to start from the top But in this one admits he might have got distracted by smaller blocks Also trying to think back to how	a) Wanted something more familiar and less demanding – something internalised esp. Sp + T, and less closely aligned T + P b) More enjoyable – leads to A c) Can take his time looking around – Sp + T d) Timer and ticking – A e) Starts pulling but then all fall down – T doesn't →P f) Mechanics don't always work though – P controls g) Sad about cows – A + Sh f) (ii) Different approach at first – T g) Starts quicker though – internalisation of Sp h) Trying to count points – T i) Time issue – A, makes him hurry – P j) Got bronze but would prefer gold – P

	side Then smaller ones nearer the bottom Timer flashes red and seems to get louder – 10 seconds left Gets 24 points and a Good job! Can hear cheers Bronze medal	many points he needs to get through the level Adding them up in his head Time is a factor as well – aware it's running out So just pulling out as many blocks as possible Feeling quite tense, aware of the clock Clock ticking and flashing red Did complete it and got bronze Seems disappointed though Seems to still be thinking about how many point he would need for gold	
8	Back to Grab tool menu Selects Pinching (16.06) (i) Has to pull away the gold bars, not the grey (minus points for these) Reads instructions to himself Uses three grabs and then runs out Gets 30 points Tries to grab something else but nothing happens Then time runs out Told to try again KM seems confused – perhaps he didn't read the instructions (ii) Tries again Looks round a bit Grabs a gold bar but the one above lands on the grey blocks (doesn't come off as well) Tries to grab a middle block Is told to grab a gold one Does so and manages to knock a couple of bars down with it Has used his three grabs but game takes a little while longer to end 40 points Gets bronze Tries again First grab – he knocks over a gold bar on top with one he picked up It bounces back and knocks over another gold bar And a grey Says something "now that…" Second grab Grabs the middle gold bar and knock of the side ones down too But also knocks over a grey (loses points) 50 points – You Win Gets silver	Next task = Pinching (i) Has to get enough points from gold blocks Says brain immediately says just pick them off But actually needs to use a fluid motion to knock them off Seemed to run out of grabs (ii) Retries Realises he has approached it wrong Now trying to topple one of them off at the same time But accidentally wasted a grab – thought he had the right idea though Did get bronze Retries At one point – shall I just hold on to this block and swing it around so it knocks down the others? Isn't sure it worked Points out that when you grab a block you seem to be holding on to it by a bit of elastic which actually makes it difficult to control Silver this time But still not gold	a) Seems to read instructions but then is confused when he runs out of grabs – T + P b) No real strategy, just picking them off – T→P c) (ii) Fails so changes strategy – internalisation T, Sp, P d) Trying a new strategy – T e) But loses a grab – T not quite → P f) Thinks he has the right idea – T, but still internalising P frame g) (iii) Bronze so tries again – P h) Similar strategy – T→P but not sure it worked that well due to control issues – P i) Silver but still not gold – P

9	Back to Grab menu (i) Picks High Horse (18.10) Looks precarious Have to pull as many blocks off as possible without dropping the grey one on top If you drop a block then lose a point Looks round a bit No timer Pulls off ones from the bottom Then tries the top Drops a few by accident (loses points) Goes for corner ones Back to bottom ones Then top again Middle small one Then column ones Which make it unstable and the grey block falls Also loses some point for knocking other blocks down 6 points Nice try but hasn't completed it (ii) Tries again Different strategy Starts from the top Pulling off the blocks directly underneath as well so grey block gets closer to the bottom – supposed to fall below Loses points for knocking over other blocks Manages to get the grey block down a level Looks really precarious Tries to get it down another level but its not in the middle Carefully removes blocks Manages to get it down again but now on vertical blocks Gets down to two but the grey block starts to tilt and unfortunately falls off (22.15) Has to watch is slowly fall to the ground Frustrated when the grey block falls anyway "woah, woah, woah" 10 points Seemed closer than last time but still not enough to pass level (iii) Tries again (22.41) Takes an aerial view Seems to stick with the same sort of strategy Manages to get it down one level Also removes smaller easier to reach blocks	High horse task (ii) Had several goes Said he got really into this one First attempt Starts at the bottom – trying to set it up for later Then spotted the middle ones were columns Says he destabilised the grey block though Didn't realise he was losing points for knocking down other blocks at this point Later on tries to catch the falling ones to avoid losing points Also got annoyed by the fact that occasionally a block that you throw away bounces back – should be gone really Trying to set it up so he can remove bring the grey block down a level But then realised the column blocks were going to make this difficult – too high up Brings it all down when he tries to remove one (ii) Said he was very focused on this task Not even sure how many times he tried it Second go Starts from the top this time Says he grabbed the wrong block though When you pick them up seem to be on an elastic string that makes it easy to knock other blocks Gets very annoyed by this Trying to get the grey cube onto four of the pillars Then remove two pillars so the grey is leaning at an angle Says it got weird as though he grey dropped down it was all wobbly and off centre Tries to leave it alone but realises it will just tip over Pulls away a column block and it ends up falling the wrong way Seems to actually try grabbing the grey block but can't Disappointed, reckons this was the closest he got (iii) Already working out his next strategy "What I should have done is…" Third go	a) Got really into it – A (i) b) Looks around and then starts pulling blocks from the bottom – Sp + T→P c) At first didn't realise losing points – internalising P d) Realises vertical

	Take his time looks round Goes for a vertical block in the middle that makes the structure unstable Grey block falls 8 points Fails again though (iv) Tries again Look around Again goes for the one directly underneath the grey block At the start he almost pulls of the grey block by trying to remove one underneath from a sharp angle Adjusts his view Gets the grey block on the layer below Removes blocks around the structure supporting the grey Goes for ones under the grey Uses one block to knock another one into a different position (on purpose?) Goes for vertical ones Then goes for remaining horizontal block the grey one is on The grey starts to fall in the wrong direction Tries to pick off as many as he can before the grey block hits the ground To get more points 16 points Fails again (v) Tries again (27.16) Similar strategy again Removes ones from the layer below the grey Tuts when he accidently knocks a small corner block to the ground Removes precarious looking block Then vertical one Then last horizontal once under the grey – down to next layer One black starts to fall and he catches it before it does – saving a point (28.09) Looks round for a bit Goes for vertical blocks Misses trying to catch one that has accidently fallen Goes back to vertical blocks Looks around again Tries to pull away one of the blocks directly underneath the grey but pulls it at an angle that brings everything toppling down Pulls a couple away but doesn't try too hard 11 points	Similar strategy Attempted the same thing again, but trying to get the angle of the grey block better this time Then thought he should move a middle one But it all went wrong Attitude is "rack em back up" Though admits there is a point when he gets fed up Not just yet though (iv) Finds this more entertaining than the adventure mode Fourth go Picks up a block but at a strange angle that threatens to tip grey block Blames the elastic thing I ask whether it's the angle he's pulling it from Decides to try it from a high angle to avoid this Bounces back – annoying Says your heart feels like it's in your mouth Feels annoyed but also increasingly resigned to the fact he is likely to lose as he is losing points from falling blocks Reason why he is starting to pull off blocks a bit quicker Still, there he does still hope there is a chance Says "if I can just get it off those pillars, I've got it" Catches a falling block (1.03.08) Pulls out a horizontal one underneath the grey Causes it to bounce and fall off This time he attempts to grab as many of the falling blocks as possible to rack up some points, before the grey one hits the ground Might get enough points Fails (v) Fifth go Beginning to give up on it Similar strategy Now tries to grab any block that falls before it hits the ground (avoid losing points) Figured the weight of the grey block was towards the right so he went left Trying to work out a strategy So keeps using the camera to look around But pulled the wrong way	ones will be a problem – T e) brings it all down, and fails – P (ii) f) Tries again, different strategy, starts from top – T→P g) Elastic string annoys him – interrupting T→P h) Fails again – P but thinks he's getting closer – internalisation i) Working out strategy in interview – T j) (iii) Slightly diff strategy – T k) Still enjoying it at the moment, better than adv. mode – A l) (iv) Trouble with the angle he pulls at – still internalising P m) Heart in mouth – A n) Losing patience though – due to T not →P o) Starts to catch falling ones – T p) Annoyed when they bounce back – T→P q) As they fall grabs as many as possible – T but still fails – P r) (v) Getting fed up with lack of success – A s) Still trying to work out an effective strategy – Sp+ T t) Fails though – P

	Fails again (vi) I say there is only 5 or so minutes left (29.31) He says he wants one to have one last go on this task Starts counting the blocks in the stack Looks round Seems to be a slightly different strategy in this case Goes for vertical blocks on the side first Catches a falling one (30.26) Pauses and looks round Goes for the bottom layer – pulls one out but at an odd angle and it takes another block with it Removes loose block Then goes to the top and starts trying to get the grey one down a layer Does so Pauses again and looks round Starts on the layer below the grey But the second block he removes unbalances the grey and it all starts to come down Tries to grab one or two but all the blocks seem to tumble Fails again Doesn't even wait for score Quits the level Decides to have a last go on a different level within Explore	And it comes tumbling down (vi) Sixth and final go "Oh another one! Counts the blocks out loud Trying to work out how many he could get to make enough points, without touching the pillars Accidentally knocks over a block – loses a point Stack gets unstable Thinks he's counting again Irritated by a middle block But fails	u) Still wants to succeed, asks for one more go – P v) counting blocks now – T w) But stack becomes unstable and fails – T doesn't →P x) Evidence of frustration with task – quits before "nice try", leaves grab tool and tries a different level – A
10	Chemical blocks Kick Stand Reads instructions to himself Has to get all 52 gems in as few throws as possible Looks around for a bit Throws at the table leg which moves the chemical blocks to hit each other and explode Gets 38 gems Looks around again Throws at chemical block supporting the rest of the gems Gets all the games 2 throws Gets a silver	Chemical reaction Kick Stand (1.07.07) Decided to stop playing the other task because he felt he'd spent too long on it Took him a minute to remember that when you knock the green blocks together you get an explosion so what he was looking at was a chain reaction type puzzle Usually a way to do it one or maybe two throws Would try for one Hoping for enough of a blast to topple all the gems But didn't get it Has to throw again to finish Suggests he needs to try a different angle (already considering his next approach) Gets silver	a) Remembers green blocks explodes – internalisation of P b) Needs a chain reaction – T c) Wants to do it one but needs two – T not quite leading to P d) Silver – P
11	Asks if he can do one more I say ok He chooses the next task – Reaction (i) Reads out instructions to himself Can do it in 2 throws (for gold)	New task Reaction – the last one he tried "look at all those golds" (wants them all to be gold) (i) Looking for a way to create a	a) Still involved, wants to do one more – P, A b) During interview, wants

	Six stacks with chemical blocks arranged slightly differently Need some sort of chain reaction Looks round a bit, and from above says "Oh dear" Throws at one of the stacks It causes and explosion but he only gets the gems from that stack (14) Throws another stack but the same thing happens – shakes his head Aims for the middle and in the end has to strike each one individually His strategy doesn't seem to work 6 throws – says "rubbish" Says rubbish Fails level (ii) Tries again Seems to really want to get this right – doesn't even ask if he can have another go, just does it Looks around again Aims higher up for one stack but only gets the gems in it Plus one gem which stays on the bottom chemical blocks Looks around again Aims lower at a corner stack Seems to work better Even has a chain reaction explosion Throws again at last tall stack left Gets it But rushes the last throw Misses the last gem and has to throw again – laughs Five throws So fails again Says his time is up and I agree I ask if he wants to save his progress but he says no Says he'll play it all again anyway	blast in one direction that will topple the towers Looks from an aerial view Tries to figure out what would create a domino effect Looks at towers to get an indication of which way they might blow out Needs to work out a starting point Thought if he aims for the bottom then it should blow out in a specific directions Throws - didn't go the way he thought though Remembers he then throws at each tower individually in the end – laughs None of which explode Realises what he needed to do was aim for a gap, that would knock two blocks together in order to cause the explosive reaction he wanted Nice try (ii) Tries again Looks around a bit Though also aware he is running out of time in the session First throw only knocks out one tower though Throws again and knocks out four towers this time Gets more of the reaction he's looking for – pleased But didn't spread quite wide enough Had to throw twice more to get the rest of the gems Five throws – nice try	all gold – P c) Trying to figure out strategy – Sp, T but having trouble internalising info (oh dear) d) Throws six times and fails – T didn't →P e) During interview still working out strategy – T f) (ii) Evidence of A involvement – doesn't even ask if he can try it again, wants to pass task – P g) Tries again and this time gets a chain reaction – T→P h) But seems to rush it and has to throw at the same gem twice – P (and perhaps A, Sh, because he knows he is running out of time in the session) i) Fails – P j) Doesn't want to save progress, says he'll do it again – not happy with P?

Appendix J: Note table for Case 3

Guitar Hero III

	Description	Interview	Notes
1	Unfortunately SD card doesn't work Decide to go ahead anyway Watch him play the first few songs and get enough cash to buy some in the store Idea is to play how he normally does though Chooses medium difficulty Chooses Axel Steel Mentions wide screen at KMI Skips intro sequence	Normally uses his own name Always does so, even online Picked the character he always does Always goes for him Got the advertising board for the older game of that character, while he gave it to his younger brother is attached to the character	a) Name and character – N (personal) b) Medium difficulty – P c) Skips intro – not interested in N
2	Slow ride – Foghat (1.20) Starts well Uses whammy bar Gets 50 note streak early on Star power – misses a note straight after Missed a sequence of star notes Shakes head when misses notes Seem to use hammer on and off Misses long red note – looks down at the guitar in confusion then laughs Looks at score and star page very briefly Four stars 93% notes hit Shakes his head at the end of the song	Decided to play the songs in order Apart from the songs he bought Slow ride Thoughts going in – looking at screen and thinking it was really dark Played this song before a few times 5 starred it, gold five stars What he wanted to do Started well Said he couldn't get a single hammer on this – maybe the lag is different, possibly due to video mixer Attention Only pays attention to the colour of the notes Tries to get timing from the song itself, because it seems to change according to what you are playing it on Pays almost no attention to the score or rock metres (40.05) Very occasionally if something hard is coming up, now that he knows that is what you use star power for, he look on the right (i.e. towards star power) Otherwise doesn't Says he is more interested in the music/rhythm side than the score Says he used to be very competitive about games and scores Back in the 80s Stopped playing for a while (90s) Getting back into them now, especially the music ones Has used the competitive online feature, recently Starting to care more about his score now Caught himself starting to think he has to do this perfectly Uses hammer ons Had trouble with timing	a) Internalised song – P b) Aims to get five stars – P, had before – N c) Lag between screen and controller – P controls d) Focuses on which notes are coming up but listens for when to press – T e) Doesn't pay attention to score or rock metres – T f) Saves star power for difficult bits – T g) Used to be more competitive but now more interested in the music – P (macro)? But now starting to care more about score h) Playing online now – Sh, more competitive – P i) Uses hammer ons, but reckons strumming is more forgiving – T and internalising T→P j) Ignores crowd, can be distracting – T k) intentionally holds star power back – T

		Doesn't pay attention to the crowd Tries not too In the penultimate level – Japanese – finds the them very distracting Misses some hammer ons in a row Says when you strum though, the game is more forgiving about your timing Feels frustrated when he misses a long note Same of the star notes Star power (42.35) Used to use it as soon as he got it or wait till a chorus of long notes Now hangs on to it longer for complicated sequence as it's not supposed to matter if you miss notes I thought it did matter Have a discussion He says he's never got lower than three stars, apart from on hard Read something about how it works on a Wiki page about the game Flaw in the new game is that it's more difficult to get star power so don't have it when you reach a complicated sequence So keeps it for specific sequences	l) Discussion about star power – maybe hasn't internalised P m) Wiki page – Sh affecting T and P n) Gets four stars – P
3	Talk dirty to me – Poison (06.00) Seems more comfortable Starts well Whammy bar Star power but doesn't use it Gets 100 note streak Misses a note a little later on though 50 note streak Misses star sequence Seems to have trouble with the solo bit Misses star sequence Misses a lot of notes in a row, shakes his head Misses a chord Uses whammy and star power at the end Glances at score page 4 stars 130 note streak	Talk dirty to me - Poison (43.10 but still talking about star power) Very familiar song by this point Doesn't get very excited about 50 note streaks Doesn't really pay attention to it but is aware of it More so about 100 note ones Doesn't find the floating streak banner distracting anymore Reckons that they place them in certain areas so you pay subconscious attention to them Says you get used to it pretty quick Aware he has star power but holds on to it on purpose Sometimes activates it without meaning too, because controller is quite sensitive when using the whammy bar Frustrated Plays two player at work as well Whoever is about during breaks Uses star power when he realises the song is finishing Only pays attention to the star rating at the end Not the score Or the money side of things, doesn't reckon it works that well	a) Very familiar with it – internalisation → incorporation but then misses a few notes in a row b) Shakes head – A c) Not bothered by banners – internalised Sp d) Star power again – T e) sometimes activated without meaning to though – P controls, and Sp (tilt controller slightly) f) Players with people at work – Sh g) Stars not score – P h) Money not interesting – N
4	Hit me with your best shot – Pat Benatar (10.18) (Seems to be playing each song in sequence)	Hit me with your best shot (46.49) Again starts well Long sequence of notes Says they are quite annoying but	a) Finds long sequences of notes annoying – need to have very accurate

	Starts well Gets the star sequences Gets long sequences of the same note really well Again doesn't use star power straight away 50 note streak but quickly loses it Does continue to try and use hammer on Has a little trouble with solo bit, especially hammer on notes Uses star power 50 notes streak Uses star power Uses whammy on last chord Score 4 stars But doesn't report streak because of the encore	reminded him of playing bass – one of the more realistic aspects of the game I mention the co-op mode where you can play bass parts and sometimes that's all it is He then says he really enjoys it Says there is one terrible aspect of the game – star power means you can't hear the bass line properly in co-op mode Keeps missing hammer ons Reckons they were harder on Guitar Hero II, got the hang of them but now sometimes seems to have something to do with the TV, seems to be a different lag than usual Star power Seemed to be doing ok so decided to use it Not clear what the rules are exactly I try and explain how the score and multiplier works during star power and my thinking He reckons that you should actually use it when you're doing badly Maybe it stops the rock metre dropping – what is being said on the wiki Battle mode makes more sense in this respect Nothing to do with context But somehow get more of an idea of what you are doing Gets you to focus on the stars and getting your power ups – all you pay attention to Good for game play But maybe not so great from a music perspective	timing – closely aligned T and P b) Likes coop mode – Sh but sound can ruin it – A, which affects P c) Trouble with hammer ons – either the timing T not →P or P controls d) Uses star power – T e) Another discussion about when you're supposed to use – T, but also lack of internalisation? Or even a problem with the game instructions – P, Sh f) Wiki again – Sh g) Battle mode makes you focus on getting stars and tilting, makes more sense than star power to him – N, fun game – A, but less about music (P)
5	Asks about time After the encore reckons he will have enough points to go to the shop Encore – Rock n' Roll all night (13.36) Asks if he should play – I say yes Says he should have brought the newer Aerosmith game as there is lots he hasn't played on it Starts well Gets and uses star power very quickly Uses it just before long notes 100 note streak Again star power seems very quick – must be getting all the star sequences Uses star power Uses the whammy bar a lot Just stands during the pauses Solo section	Rock and Roll all night – Kiss song Anticipating certain bits of the song Fun to play certain bits Likes that it has gaps so he can come back in after drum beats Have to be careful with where you place your fingers (52.10) Forces you to practice certain combinations Has experience playing – bass Thinks it has been helpful to him Timing and chords Compares people who says it's not like playing real guitar to someone trying to compare driving to driving games Mentions a guitar sync where you can pretty much plug in a real guitar Gives you like tabs which tell you which fret number to hold Reckons it would only work with bass though as otherwise you couldn't interpret tab quickly enough to play it	a) Enjoys playing this song, familiar with it, has favourite bits – A, T + P b) Placement of fingers – Sp, P controls c) Previous experience of bass helpful – internalised P (macro) d) Does very well in this song – evidence of incorporation? Must have internalised A, P, T, Sp frames e) Importance of being familiar with

	Has trouble getting all the notes Uses star power but has some trouble hitting all the notes Score 5 stars 169 note streak Skips cut scene immediately	Maybe just for solos Not sure how it works Pauses in the Kiss song If you like the music then won't mind it Can imagine it would be frustrating for someone who isn't though	song – internalisation of A and P
6	Goes back to menu Visits store Leaves store Goes back to the store Seems unfamiliar with it Finds songs after I tell him where Chooses a song – Go that far by Bret Michaels Leaves store I say he can choose another one He goes back and chooses - Hier kommt Alex by Die Toten Hosen Chooses pretty quickly	Shop Doesn't pay attention to the money he gets Has been in the shop before Checked out the bonus tracks but wasn't impressed Figured that the best songs were already in the game Says Rock band already has a package you can buy Reckons that would be better with Guitar Hero as opposed to a new game Doesn't seem to be much online content Didn't have a console – one of the possible issues with the Wii was the fact it had trouble with it's online stuff New songs Familiar with Bret Michaels but didn't know song Familiar with Die Toten Hosen song from when he was younger Seems to be different songs unlocked on different parts of the game e.g. RHCP Suck my Kiss only on Co-op	a) Doesn't seem that familiar with it – lack of Sp, P b) Buys unfamiliar songs because I asked him too – Sh c) Chooses a song where he knows the band, and one he remembers hearing when he was younger – T (choosing something a little familiar)
7	Goes back to main menu Bonus tracks Selects Go that far – Bret Michaels (18.50) Says he doesn't know this song, but remembers the other one from his teenage years Starts ok Misses a large number of notes near the start Green and yellow (1st and 3rd fingers) Seems to have a trouble with this sequence Laughs Rock metre in the red Climbs back though Bar starts to rise as he gets more notes in a row Gets and uses star power soon after Seems to be getting the hang of it after a while Getting a lot better at the yellow and green sequences he had trouble with earlier	Bret Michaels – Get That Far (57.25 but still talking about unlocking songs) Starts out listening to it, trying to get a feel for the rhythm of it When started to miss some notes at the start (yellow and green sequences) Said he was going to ask me to put the volume up so he could hear it better Important to be able to hear it And rock music needs to played loud! Just trying to get the timing of the song Abstractions don't always fit the rhythm and how you would strum a real guitar He couldn't hear anything so had to go back to the screen Finds the screen unsettling On a familiar song do better on the rhythm, strumming bits Didn't know them in this case Says he can't pay attention to when the screen tells him to press notes – disconcerting Sometimes adds bits that aren't there e.g. in rock and roll and in sunshine where he knows these bits really well	a) Trying to get a feel for it – internalising A so can T→P b) Started to miss notes – P c) Was going to ask me to turn it up – importance of A, especially because he listens for the notes rather than watches – T d) Hasn't internalised the song so can't wait for rhythm bits – T e) But has too wait for screen to tell him when to press notes, disconcerting – hasn't internalised Sp f) Tries to focus on notes coming up

	Does better on these second time around And third (end sequence) Does miss notes though, especially on new sequences Laughs at the end Score Gets three stars – laughs "three stars" 21 note streak	Some songs do allow this though e.g. Parappa This game doesn't though, for instance lose the star power sequence if add a note Tries to focus on the notes that are coming ahead (1.00.33) Not paying attention to rock bar During the solo more difficult to jump back in When he realises he's lost the rhythm, tries to wait for longer a new bar to jump back in again But can't do that on a solo – try and wait for the long note Sounds a bit like a strategy Getting the hang of the pattern after a while Looks like he's waiting for a specific pattern Missed the last note – very frustrating	(as opposed to when to press them) – T g) Didn't notice rock bar dropping as he missed notes – T h) Instead waiting to jump back in – T i) Difficult to do this during a solo though, so waiting for a recognisable pattern to come up again – T j) Frustrating when misses last note – A k) Laughs, knows he can do better – P, N personal
8	Checks the time Then plays Hier kommt Alex Has trouble with the opening acoustic sequence "Don't remember…" Gets into it though Seems pretty good at getting long sequences of the same note in a row though (e.g. just red) 50 note streak pretty quick Gets star power and uses it soon after Whammy bar Uses star power Seems to be doing better than the last song he tried Finishes the song using the whammy bar Scores 3 stars 86 note streak	Die Toten Hosen – Hier kommt Alex (1.02.45) Remembers hearing before Was confused by the start as didn't remember acoustic intro Trying to pick it up quickly Realise that this isn't about learning it for later but trying to complete the song More relaxed More familiar as the song kicks in Finds long row of having to play the same note frustrating as in real life no one would notice if you missed one but the game does penalise you for it Hears the crowd cheer Says it's a shame he ignored them Notices it when someone else plays though Has noticed that when there is a slow start to a song, he does he the cheer because it takes a while for the rock bar to rise Holding back star power again Uses it as song as he sees a sequence of more complex notes Says in general songs are more enjoyable after you've played them a couple of times When you know what to expect Can be quite jarring when you miss a note and the sound drops out	a) Remembers the actual song, chose it on purpose – T b) But thrown by acoustic intro, didn't remember it – personal N got in the way at first c) Not trying to learn the song itself, just complete it – T d) Relaxes as it gets more familiar – A increases, as personal N kicks in e) Game penalises you for one missed note in long sequence – annoying as wouldn't happen in real life – A f) Holds back star power again – T g) In general songs more enjoyable when you know what to expect – A increases once you've internalised the P, T, Sp and A sounds (incorporation?)
9	I say he can choose what he wants to do Goes back to main set list See if he can do better at an earlier track	Could do what he liked so decided to go back again to play one of the earlier songs as he wanted to get a 5 star rating Aims to get this on everything on the career mode	a) Chooses to replay an earlier, familiar song, as means he could get five stars - P

	Decides to do Hit me with your best shot again (27.14) 50 note streak quite quickly But then misses a note Star power but doesn't use it 50 note streak 100 note streak Misses notes and chords towards the end Mutter something Score 4 stars 108 streak Shakes his head at the star rating at the end of the song	5 gold too high (pretty much perfect on each song) Did Hit Me With Your Best Shot as reckons it's the most interesting The patterns of notes – seems to like them Easy to remember as well Reckons he didn't get five stars because he missed stuff on the solo bits Pleased with hammer on/off sequence Look at the screen see what coming up and ignore it Play it when you know you're supposed to not when you see it at the bottom of the screen Way that he plays Looks ahead to sequences coming up Times it from the music Means you have to rely on recognition so need to play the songs more than once to do well on them Doesn't use practice mode Did on the last game Slows down songs too much Or don't have the backing Finds it laborious	b) Finds the pattern of notes interesting – T→P c) Easy too – P d) But had trouble with the solo bits – with T→P e) Gets four stars, not pleased – P, A f) Has a strategy for play, when you hear the note, not when you see it on screen – T g) But emans you have to be familiar with the song – internalisation needs to have occurred h) Practice mode laborious – A
10	Turns round and asks "One more?" I say he can play one more He chooses the next level Sunshine of your love – Cream Doing really well 50 note streak 100 note streak Loses the streak even though it look like he got the chord Shakes head slightly Perhaps he didn't hold it long enough Getting the sequences 50 note streak Star power but doesn't use it straight away 100 note streak Misses at the start of a long red streak Looks a little annoyed Then uses star power and whammy Misses a few notes here and there afterwards 50 note streak Gets all the end notes though Gets all the chords Waits for the score/star page Score Five stars – nods very briefly 126 streak	Chooses to play Sunshine again (1.10.55) Used to play it live Very familiar with it Auto-pilot Not thinking anything specific Played the song very well Played this song and Black Sabbath track enough in a real band to know it back to front though Only problem is that doesn't know the lead solos But that makes it interesting to play Aiming for 100 note streaks Reckons you get higher star rating by getting as many notes as possible Whammy bar might help too but not sure Score goes faster Is aware of this Sometimes seems to activate star power accidently as well We don't seem sure about how it works and manual doesn't seem too helpful He hasn't looked at anything else, apart from the wiki, because familiar with the series Pleased with his end of note sequence Checks to make sure he got five stars I asked if he enjoyed that He said yeah, especially the last song	a) Want so play onw more to get five stars – P b) Chooses a song he is very familiar with, from bass playing days – P, T c) Can go into auto-pilot – incorporation d) Wants 100 note streaks (not 50), thinks they add to star rating – P, T e) Whammy bar might too – P, T but not internalised f) Whammy sometimes seems to activate star power – P controls g) Pleased with performance here, both end note sequence and five stars – P, A h) Enjoyed it – A

Appendix K: Note table for Case 4

Boom Blox (2)

	Description	Interview	Notes
1	Actually tried to play Guitar Hero III but technical difficulties meant he would couldn't really play it so decided to try Boom Blox instead. Not getting the response he expected from the game – serious mismatch between the controller and the game but not sure what the problem was exactly Hadn't brought in any saved data But used the previous participants instead so certain tasks were unlocked	Brief interval for biscuits etc And fast forwarding through Guitar Hero bit Issue with Guitar Hero III Was a little embarrassed by it Thought we might not believe that there was a problem Didn't want us to think he wasn't any good at it But timing of controller did seem off	a) Control issues – disrupted P b) Presence of me and Dave – Sh
2	Select profile (15.37) Checked the options Explore Gem Blox Warrior (16.10) – bring them all down with one throw Uses the Wiimote to look round Pauses Throws and gets all the gems Laughs – seems pleased Gold	Boom Blox (51.08) Decided to go with existing profile so certain tasks were unlocked Options Trying to remember where 'jenga' type game was He thought he went for top left option but actually went for the middle one Explore Went for easiest one Warriors Done it before Solved it easily, remembered how he did it by focusing on the big panel "Bish, bosh, bash" Felt comfortable Knew he was going to get gold	a) Evidence of incorporation – internalised the frames to such a degree completed task easily
3	Teeter totter (16.51) – use heavy gem to tip balance in your favour Says "I remember this one" Does the task pretty quickly and gets all the gems Gold Says he will try something he hasn't done before – as he finishes the last task	Teeter totter Felt a little guilty because he had done it before Not the equivalent of doing medium songs for Guitar Hero Solving problems he had already done before Felt he had demonstrated competence and proficiency "I am good at solving problems" I had asked him to try things he hadn't done before so moved on	a) Evidence of incorporation – internalised frames b) Demonstrated competence to me – Sh c) Chose other tasks because I asked him to do try things he hadn't – Sh
4	Goes back to Explore and looks at options Chooses Bomb blox Minefield (17.49) – blow up all bomb blox	Bomb blox Minefield (53.57) Chose something he hadn't done before because I asked him to Had seen a similar problem earlier though	a) Uses different camera angles - Sp b) Evidence of previous

	Says he hasn't done any of these as he chooses the first task Looks around Takes an aerial view Has 2 balls Throws one and causes a chain reaction (can hear cheering) One stack remains though So throws the second ball Gets gold	So was looking for a "certain path" amongst the blocks – where does it start and end? Trying to get a circuit Wondered what the significance of the big block in the middle was though Not obvious for him though Aimed to one side of the opening in the pattern to the side Had to throw again to get the middle big block though Thinking about whether he could have done it with one throw Couldn't remember if one throw was enough to win gold though Got gold for 2 throws Was thinking about alternative strategies – considering doing it again But since he got gold, then there was no point doing so	knowledge – internalised from P c) Takes his time working out a strategy – T d) Then throws – P e) Thinking about how to get gold, motivated by this – P
5	Bomb Barn (19.18) – explode the hidden bomb blox Nods as he reads instructions Looks round quite a bit Says "Two balls?" Looks from above and throws at top stack but it just bounces off Tries again but aims to the side This time he reveals the bomb blox underneath Says "ok" Tries the task again Holds Wiimote with both hands and throws at screen but nothing happens Laughs a little Seems to get frustrated when he throws and the game doesn't seem to register it Throws again (one hand) and this time gets them all in one throw Laughs Gold	Bomb Barn (55.27) Not sure at first, trying to think about what instructions said Looking for a weakness in the walls Thinking about how to make it collapse on itself First throw was exploratory – just do something to see what happened Not going to cost him anything Once he revealed the bomb blox he knew what to do next Knows how to solve it in two hits Take away the planks and through a ball in to hit the bomb block Still having fun at this point Does exactly what he said on his retry Though slight coordination issue with the controller Have to let go of your thumb at the right moment Almost have to restrain yourself with it	a) Considers instructions – P b) Orientates camera angle – Sp c) Works out strategy – T d) Exploratory throw – T→P e) Evidence of learning – tries task twice, is more successful second time – internalised Sp, T + P e) Engaged – says he's having fun f) Controller issue – interrupts P
6	Bomb Push (21.02) – nudge bomb then blow it up Reads over instructions Pauses and then looks round the area Throws but the block doesn't explode, does move further up though, nearer the other blocks Tries again but throws harder this time (with both hands) Gets it says "Back of the net" Gold	Bomb push (57.33) Comments on instructions - spends time reading them as: Not always so clear Feels more like a clue than an instruction (instruction shouldn't be ambiguous) Finds himself trying to memorise it "almost word for word" so when he faces the problem he can recall it "very kind of coy", not always sure what they mean In this case, couldn't believe it was as simple as the instructions implied "wow look at that, it is as simple as that"	a) Same approach – look around (Sp), takes time (T), then acts (P) b)Instructions seem more like clues – not always helpful for actualising T in P frame c) Follows them though and they work – t→P d) Surprised

		Game physics not what he expected Don't always expect the blocks to move as easy as they do E.g. expects gold to be denser than wood but doesn't seem to make a difference – like "fairy dust", goes all over the place in the last level	though cos game physics doesn't always work like he expects – i.e. T doesn't always → P
7	Bomb cascade (21.57) – topple bomb stack to blast point blox Pauses and looks around for a while Throws one, blows up bomb and knocks over large plank Bombs land underneath stack Looks around again Throws at bomb pile and gets all the point blocks "Never fear" Gold	Bomb cascade (58.56) Thought about the different strategies Take the step out on the bottom left, underneath the tall bomb tower Or focus on the big panel of dynamite behind it? Went for the big panel which knocked the stack over Disappointed when the bomb blox that fell didn't all go off though Dynamite should really But had to throw at the pile – went for the edge of the pile so the blast would project into the stack holding the point blox Doesn't understand what the difference is between the bomb blox hitting the ground and having to through at them to make them go off – should still blow up	a) Same approach b) Considers different strategies – T c) But didn't expect this result – T didn't → P, issues with game physics
8	Sliding bomb (23.23) – Blast down a ramp for the big Bomb Block to slide on! Once it starts moving, you're golden! Reads instructions carefully Throws once and cause the bomb blox to slide down the plank Throws again as it moves down and gets most of the blocks Silver as didn't get all the points	Sliding bomb (1.00.16) When he read the instructions – "It's like, what?!" laughs Timing is important in this one Hadn't come across this before Figured from instructions though he would need to create a ramp Block would start moving and he had to go for it – instructions more helpful for this one Kept him on his toes, as need to recover you're aim quite quick	a) Instructions aren't explicit – not sure how they help T – but realised he needed ramp and so managed T→P b) Has less time to think – T + P more closely aligned
9	Flying bombs (24.12) – use big bomb to launch smaller bombs Looks round at set up Starts well Throws at main bomb block – hits plank, launches the other bomb blox Misses the flying bomb blox though Sighs and says "come on!" Nice try Tries again Doesn't look round, goes straight for it Gets the flying blox this time Sighs and says "Back of the net" Gold Goes back to the options, seems to go to the sliding bombs task	Flying bombs (1.01.19) Had time to look around at first Timing again very important Missed the flying blocks at his first attempt Previous level seemed like an intro to this idea Timing even more crucial as the blox are moving faster this time Tried it again – wanted the satisfaction of completing it Ready for it on his second attempt Luck as well though Understands the principle (knew what he had to do) but doesn't consider being able to get them a skill Can shoot something by pointing a gun and pulling a trigger but doesn't mean it's accurate Almost expecting not to hit them in this	a) Same approach – had time to look around and think Sp + T b) But missed the flying boxes – P c) Tries again and succeed – evidence of learning and internalisation of frames d) But thinks he was lucky because T doesn't always → P

	again (which he got silver for) But goes back and chooses the next one	case – thought it would take him longer to actually do hit the blox accurately Goes back to Sliding Bomb but doesn't choose it (1.02.24) – but don't ask him about this as still talking about the last task	
10	More flying bombs (25.19) – more bombs and flying, more fun? i) Looks round a bit Does well on his first throw (both hands), causes a chain reaction of events, but misses the flying blox Takes to long to throw at them Makes a frustrated noise – grr? Nice try ii) Tries again Same thing happens but this time he doesn't even throw at the flying ones Does throw but throw doesn't register for some reason Doesn't seem to realise he still has a ball left and doesn't throw again Looks at Wiimote when level doesn't end straight away Seems slightly confused Pauses the game and chooses retry iii) Tries again Does the same thing again but this time when he tries to aim at the flying blocks the pointer doesn't even appear Possible problem with the pointer? Seems to flicker Spins view round and then throws the last ball iv) Tries again Same again Hits them this time but only gets a few points Aims a bit too low though Not enough to pass Seems to be getting annoyed - tuts v) Tries again Same approach This time doesn't even throw at flying blocks Aims at them but nothing – not enough coverage? vi) Tries again Same approach This time he aims slightly higher up – blocks also seems higher Gets all the points	More Flying Bombs First attempt i) Wasn't sure at first what was going on Only figured it out after he threw the first ball and the rest of the bomb blox went flying up in front of the point blox Then it made sense Definitely needed accurate timing Small and fiddly Did this one a couple of times (6 in all) "it started to grate after a while" ii) Cursor flickering At one point it seemed to lock Feels that he knows what to do Wants to do as well as he can If he can do it one he will try and do so iii) At this point the cursor seemed to stick but he says even if he had managed to throw the ball the boxes didn't fly high enough iv) Next attempt Hit some of them but only on their way down Less annoying when he manages to hit some of them v) Next one Laughs at it Chooses not to throw – says he didn't have a lot of coverage Nothing to throw at vi) Next one Got them this time Says blox seemed to go higher Saw his chance and went for it A little annoyed Coverage should always be the same but it isn't Shouldn't just "get lucky"	a) Same approach – Sp + T b) But not sure what to expect so fails (i) – T doesn't → P c) Evidence of learning – figures out T from first try d) Still fails (ii) due to controller issues – interrupt P e) Fails (iii) because of controller issues – P f) Gets some boxes but still fails (iv) because boxes don't always reach high enough – T doesn't → P g) Fails (v) because he makes the decision not to throw – T as box coverage poor – P h) Succeeds (vi) – T→P but no satisfied as he doesn't understand why he would get different results each time

	Gold		
11	Bomb push 2 (28.51) – Bomb ball explodes on impact or press A for mid-air blast Looks round Focuses on the middle, throws with both hands Gets them all as bomb ball explodes on impact Gold	Bomb Push 2 (1.06.36) Kind of knew what was the instruction meant Similar to previous problem - like a bowling ball, slightly off centre Full power and it worked	a) Instructions – useful for T this time b) Same approach – Sp + T c) Succeeds – T→P
12	Leaves the bomb levels and goes back to explore mode	Had enough Narked with dynamite boxes Had as much fun blowing up boxes by this point as he was ever going to Having less and less fun – "more like doing a tough crossword puzzle" Not so much satisfaction If he was playing on his own probably would have quit as would have thought he had better things to be doing Thought he'd persist though as still had time left and wanted to give me enough data Try something different See if he can have any different fun with the game	a) No enjoying this level anymore, previous episode seemed to annoy him as dynamite not behaving like it should – T not → P
13	Chooses Chemical blox Beakers (29.53) – knock chemical blox for chain reaction and clear gems in one throw Looks round for a bit Pauses and chooses to retry the level Re-reads instructions Looks round again Aerial view and back round to side view Throws a ball at the nearest stack but it hits a green block and bounces back Throws again at the taller stack next to the first one Hits a gem block which he knocks out causing a chain reaction of explosions which gets him some gems Laughs "What the hell?" Has to throw again for the last tower – again aims at gems Bronze Tries again Throws at the middle tower this time but while he gets the gems not much else happens – no reaction this time Throws at another tower further away and only gets one gem	Chemical blox looked fun Still blowing things up But behaves more like explosions would when the blocks hit each other Beakers (1.08.59) Stumped – looking around for a bit Redid it so he could look at instructions again One throw – ok but how? Didn't make much sense to him Looking at the stacks Start low on one side, how is it going to go up against gravity? But if you start at the top will split two ways Would have made more sense if had gone from high to low in a row So in the end just threw a ball Which just bounced back Threw again at a gem this time Doesn't know why the towers exploded in the series they did Took out the rest Took out the last gems Got bronze, would have preferred gold Wants the feeling of having succeeded Did it again, wanted the gold, The elegant solution The "Oh ok, I see" moment Also thought if he was having trouble on an earlier task than he might have more problems with later harder levels	a) Chose Chem blox as thought they would react more predictably – T should → P b) Same approach – Sp + T but couldn't work out T so re-read instructions c) Struggling with instructions, supposed to get gold with one but doesn't know how – T d) Considers different strategies and tries them out – T→P e) Not happy with result though, bronze not, and also wants to succeed now so can do better later on – P f) Tries again with different T g) Fails though as T doesn't → P h) Quits because

	No chain reaction Exits the level	Next attempt Thought if he went for the gem straight away more would happen First ones he hit though just led to the green block landing on the purple Not expecting this No explosions this time, no reaction at all Same thing as last time didn't happen Narked though, so quit Says it might have been a bit "petulant" of him but not getting it Says that if he kept looking at it he could have solved it but was thinking "how much attention do I need to pay to this?" Could just be "some pleb" had designed this level, might be better ones later Not satisfying so move along	he is not enjoying the task – T → P, requiring too much attention i) Not his fault, but designer's – Sh?
14	Momentum (32.28) – another chain reaction, can you do it in one throw? Looks round Goes for lower purple block on the suspended section Slight delay as the one above falls and disappears but it causes an explosion once the green blocks knock together Gold	Momentum (1.12.56) From pervious games, knew that the purple blox vanish Thought this would be like a guillotine and allow the green to fall Which it did, but with the other purple But didn't know why the purple took a bit longer to vanish – why the delay and then the explosion? And why are there two vanishing blox and not just one? What's the point? Why did they include two? Seems like a red herring and he doesn't like red herrings Annoying him Would be better without them	a) Knows purple blox vanish – internalised P b) Succeds – T→P c) but not satisfying as doesn't understand why there were two purple blox – affecting T + P involvement, decreasing enjoyment
15	Chem towers (33.18) – "Bring the two Chemical blox together for explosive results! Aim low to do it in one throw!" Looks round Aims at a lower block – causes the towers to fall into each other Gets them all Gold	Chem Towers (1.15.20) Trying to figure out the distance between the two stacks Thinks the instructions prompt you to aim lower Experimentally threw at the stack and it worked Wasn't expecting success What are the other blocks there for if you don't need them?	a) Same approach – Sp + P b) Instructions useful – T c) But not P satisfying because doesn't get what other blocks are for – T

16	Green Punch (34.07) – Match chemical blox, one sequence can work with one throw i) Reads instructions Looks round Aims at the purple block in between the green ones on the left, They explode and he gets some of the gems but not all Throws again twice to get the last few Bronze – 3 throws ii) Tries again Focuses on the lower purple block this time Throws at it but while it disappears nothing happens "Ok…" Throws at the other purple block, perhaps from a different angle? Gets them all this time Silver – 2 throws	Green Punch (1.16.07) Tried a few times i) Trying to get a grasp of the physics here Figured if he removed the little vanishing block then green blocks would edge towards each other but then says this is actually not the initial plan he had First went for purple block, thinking it would lead the two green block together, causing an explosion that would bring the little green blocks together – though realises he might be rationalising his actions as doesn't remember this being the first solution he tried Wasn't surprised by what happened though hoped he would get all the gems Infinite number of balls but couldn't remember how many he needed for gold Used three got bronze Not happy with this so decided to do it again ii) Next attempt This time went for the other purple block Action of pressing the button on the Wiimote makes the pointer go off aim - wobbles This time expected more to happen but didn't Went for the other purple (after changing the camera angle) This time cleared it all with one throw (though already had thrown so a total of 2 - silver) Losing concentration by this point	a) Same approach – Sp + T b) Gets some gems – T→P but disappointed he didn't get more c) Can't remember how many throws for gold – P d) Gets bronze (i) – disappointed with P so tries again d) Uses different T e) Controller issue – P f) Did better but not satisfied because T not leading to the P he expects g) Losing concentration – lack of agency? Frustrating because he doesn't understand what's going on or feel he has control over it
17	Chemical jug (36.35) – chain reaction to release all gems from cages i) Looks round for a bit Takes his time Throws at the green block on it's own, knocks it into the lower left block and causes an explosions Gets a lot of gems but not all Looks around Throws at the middle green block in the stack but nothing happens (pointer doesn't seem to register) Throws at same spot again and the ball bounces back Looks around ii) Pauses and retries Retries Looks around Throws at the top tower this time – aims at the purple block on top Causes an explosion as purple	Chemical jug (1.19.28) i) Reckons this was the death knell Who would think these up? If I could come up with levels for this game I wouldn't come up with something like that Trying to line up green block to use as a soccer ball to hit other green blocks Expecting a bigger explosion Tries to hit a green on it's own but it resists No give whatsoever ii) Ends up quitting and doing it again Tries again Looks around again Different approach Gets rid of purple block to cause explosion higher up within the structure – to see what happens But still has gems left Tries to turn the lone green block into an ice hockey puck But didn't get the overlap he wanted Aims at remaining green block, ball ounces off	a) Same approach – Sp + T b) Death knell though because he can't figure out the setup – T → P c) Blames designers – Sh but negative c) Tries different strategies – T d) But frustrating because they don't work they way he wants – T not -→ P e) Tries again but quits before he runs out of throws because too frustrated by lack of predictable results

	vanishes and green ones hit each other Gets a few but not all Throws at the solitary tower – hits the chem block into the right hand one and causes an explosion Gets more but not all Throws again at left green block but the ball bounces off Throws at the same green block again from underneath but again the ball bounces off iii) Quits and tries again Focuses at the solitary tower, at an angle, looking up at it Aims, throws with both hands, but ball just bounces off Laughs Looks round briefly but then pauses the game Gives up – doesn't finish it	Aborted Seems to feel like he's spending too much time on it iii) Did try one more time Annoyed by this point Not enjoying it Didn't want the game to beat him Throws at upper most green block but ball bounces off – didn't work Quits	
18	Kick stand (40.24) – "Kill two birds with one stone to get the Gold on this level!" (i) Looks around for a while Eventually aims for the table leg (41.35) Throws and gets a lot of gems as green block knock into each other and explode Looks round Pauses and quits Retries task Looks round Tries an aerial view Aims straight down at throws at the green block in the middle of a concrete block but ball bounces off Quits (ii) Retries Looks round Takes his time Refocuses Hits brown block on the side away and green just falls down but at an angle Nothing happens Hits green again This time it works Smashes into another green and causes a reaction that knocks down the table leg and gets him some gems Hits a green block lying to one the side but it just bounces away Seems to have a problem with his aim	Kick Stand (1.22.54) Kill two birds with one stone – instructions annoyed him (i) Didn't seem to relate to set up So spread out No clear chain of events that could occur But the leg looked invitingly unstable Table looked isolated from everything else Didn't for it straight away as worried it would lead to an isolated explosion But did throw at it More explosions happened than he was expecting Expected part of it to happen But not sure why the rest did – the green in the concrete and the upper blocks also exploded No clear chain of events And still left with isolated block of gems (ii)Tries again Remembered the how resistant the toxic blocks are to the ball Thought he could get another chain of events going but the ball bounced back again Gave up (iii) Tries again This time focuses on green block on top of the wooden block Why is it on the wooden block? Hits it, falls at an angle, hits it again and it causes an explosions Tries to knock another green block into the block of gems but just bounces back Then just does it "the old fashioned way" and throws two balls at the block till the gems are gone Fails task	a) Instructions annoyed him again - T b) Couldn't figure out how Sp, T and P interrelate c) But table leg looked inviting so threw at it – T→P d) More happened than he expected, didn't understand why though – not able to internalise T and P e) Quits and tries again (ii) but gets frustrated when ball bounces back – T not →P f) Tries again (iii) but seems to have given up on working out an efficient strategy – T→P but not successful

	Throws at large green block with gems on it but doesn't seem to register Pointer flickers (iii) Tries again – gets it this time and most of the gems on it Has to hit it again to get all the gems though Five throws – nice try		
19	He has a few minutes left Rechecks options Tries Reaction (44.54) – has to cause chain reaction in a few throws Reads Looks around Aims at a stack in the middle Causes a chain reaction that gets most but not all gems One stack left Aims at last stack, at a lower gem which is knocked off allowing the green block to cause another explosion Gets the rest of the gems Gold – 2 throws Asks if we have time for another I say if he wants to he can play one more but he immediately says "No" (46.04)	Exasperated by this point Happy to hear only one more go Reaction (1.26.07) Felt it would be like a house of cards or dominoes Cause a stack to tilt into the others Caused a lot of explosions Couldn't understand why there was one stack left though Had to go for it on it's own Surprised to get gold with two throws Says maybe he wasn't paying enough attention to the instructions? Had succeeded as well as he could but felt unfulfilling Why not 5 stacks that you can get with one as opposed to six stacks you need to use two for? No satisfaction in taking down one tower on it's own Narked Will play again but not sure what level the game is pitched at? Music and dancing square cows A child would find it dull though A chore, too challenging An adult has glaring problems That sap it's fun Last level say's it all – 6 towers, can knock down 5 with one ball, nothing elegant about it, one tower per ball	a) Lack of involvement and enjoyment – pleased to hear that running out of time b) Same approach – Sp + T c) Tries out a strategy – T→P and works d) But not satisfying because wanted to get all six stacks so T didn't → P e) Didn't pay attention to instructions that said needed 2 throws for gold – T – but can't understand why designers chose to do it this way – interrupting P f) Music and graphics too childish – A

Appendix M: Case study Pilot

Questionnaire

A is a 24 year old full time post graduate student at the OU and a friend of mine who agreed to pilot the study. We have also played video games together. He started playing video games between the ages of 11 and 13 and plays games several times a week on average. During the week his gaming sessions last about an hour, with this rising to two hours at the weekends. In general, he plays action, adventure, fighting, role playing, and strategy games.

Game chosen

The game in this case was *Super Mario Galaxy* which can be described as an adventure game. This is the latest version of the Super Mario platform series, though this time in 3D. It was released in November 2007. As Mario you have to travel through various planets and galaxies in space in order to rescue Princess Peaches from Bowser. You require both the nun chuck and Wiimote to navigate the game world and defeat your enemies. At the end of the interview, A approximated he had spent 12-15 hours playing the game prior to the session.

Synopsis of game play

A starts off the game in the Comet Observatory which serves as a hub area that Mario returns to after completing each level. From here, A checked a map and then made his way to the Engine Room to access a new area. He selects the Bowser Jnr. Reactor, and then flies off to the new galaxy King Kaliente's Spicy Return. This is a boss level, so after defeating the initial monsters he has to face the galaxy's final boss King Kaliente. He dies during his first attempt but succeeds in the second and receives a Grand Star for his efforts. Mario returns the Star to Rosalina at the Comet Observatory, where he is informed of a new area he can reach from the Garden. The Deep Dark Galaxy has opened up here, and Mario flies off to the Underground Ghost Ship. A spends the rest of the session exploring the beginning of this area which includes a beach, two small planets and a locked gate. He dies once after accidentally firing himself into space, and once just before the end of the session after being attacked by a horde of pink aliens on one of the smaller planets he can reach via a cannon on the beach.

Critical episodes

1) Boss fight

The second time A encounters the boss, King Kaliente, he has only 4 of 6 sections of his "life" left. A stated that he had a sense of anticipation going into this fight. As Mario lands, alarms bells start to sound and dramatic music starts to play, affectively involving the player by creating a sense of tension. A has little time to take stock of the situation as the platforms he has to stand on start to sink into the lava the longer he spends on them. In addition, the boss starts to shoot missiles towards him, three brown ones at a time. The boss then shoots out a single green projectile, which A immediately heads for, jumps towards, and spins back towards the boss. The missile hits the boss and seems to damage him. In addition to everything that's going, blue creatures start to emerge from the lava and head towards Mario. Now there are certain things A has already internalised from this session (including what he's learnt by his first attempt at the boss) and from his previous game play. These are things like the game controls (performative), the fact that bosses are usually hard (narrative and shared), the layout of the level (spatial) that he can return green missiles (tactical), that the platforms will sink (performative), and that the lava and the blue creatures will hurt him (performative and shared). Meanwhile, all this activity suggests the tactical and spatial frames are very closely aligned to the performative frames, as A has to think about how he can defeat the boss and assimilate his new environment, all while avoiding the lava, enemies and projectiles. Basically, the boss fight seems to demand his close attention and quick response. The music adds to the tension as does the annoyance whenever he loses a section of health (affective). It is interesting to note that R looks very concentrated whilst playing this level, and this includes him occasionally poking the inside of his cheek with his tongue.

As the game progresses, A returns more than one green missile in a row, and the King's reaction (Kaliente splutters and turns red – something A recognises as "the next stage of boss" from his previous gaming experience) convinces him he has found the correct strategy to defeat the boss. He eventually manages to return enough successive missiles to do so, which can be described as the

actualisation of tactical involvement within the performative frame. The internalisation of all this knowledge and experience and his ability to act within the game through an avatar results in the experience of incorporation; a deep sense of involvement that culminates in the tension that A testifies too when he talks about how relieved he was once he finally defeated this boss.

2) Getting stuck on the beach

A lands in a new galaxy and begins exploring straight away (spatial involvement). In the interview, he points out that he immediately saw the pedestal by the gate and knew what he needed to open it – a Fire plant to turn him into Flame Mario so he could light the pedestals; essentially he had already internalised this knowledge about how to perform in the game. However, it wasn't until the end of the session that he actually found the plant he needed. During this episode we see how A moves mainly between the shared, spatial, tactical and performative frames by trying out different strategies; including talking to friendly characters, exploring every possible area (from the nearby planets he can fire himself to with a canon to swimming underwater in search of a possible underground tunnel) and trying out different attacks on new enemies (shooting star bits at them, jumping on them, spinning at them) in the hopes that he will gain access to the elusive fire plant. A actually just misses the object he is seeking the first time he lands on the planet the Fire plant is actually on. The planet it surrounded by enemies, so instead of exploring it properly he runs straight for the Star that will get him off the planet. His desire to avoid harm, over rides his desire to explore at this point and so he makes the tactical choice to escape, though he eventually does come back to explore again. When he does he finally sees the plant, and grabs it to become Flame Mario he is unfortunately overwhelmed by the monsters surrounding him. However, though it is the end of the session he is relived he has finally found what he is looking for as "Now I know what to do", and effectively starts to plan what he will do when he tries the level again (tactical involvement).

What is interesting about this episode is that A does not seem as involved in the game as during the boss fight. The music and sounds in this level create a more relaxed atmosphere, with less affective tension, and the longer A spends running around the area the more bored he seems to get. If anything he seems slightly frustrated with the lack of effect his actions are happening; the actualisation of

tactical involvement does not result in the consequences he is looking for within the performative frame. He starts repeating previous actions and trying out increasingly ineffective strategies such as shooting himself into a castle wall which he later describes as "a moment of madness". Interestingly, after the canon episode he asks how much time he has left in the session, which could be seen as evidence that he is losing interest by this point. However, during the interview, when the section where he finally finds the plant is reviewed, he seems to regain interest through engaging in the tactical frame by formulating a plan for what he was going to do next. It can be argued that during most of this session the lack of outcomes achieved in the performative frame and the general pace of the game (where the frames seem less closely aligned) mean A was not paying as much attention as he was during the boss fight, and he was generally less involved.

Conclusions

In this case, the DGEM effectively accounts for the how both the game affects the player and the player acts within the game in order to achieve a sense of incorporation, which refers to both the experience of internalising aspects of the game and to being able to act meaningfully within it. Further, it allows for a discussion about what the player has internalised previously, and during the session itself, which feeds into their experience of involvement. The beach episode in particular indicates how involvement can be reduced by a lack of perceived progress. In fact, the analysis suggests it is not so much learning that requires involvement but that deeper levels of involvement require certain types of learning to have occurred in the first place.

Conceptions

1) Learning

A described learning as experiencing something, remembering it and being able to use it again. He referred to *Super Mario Galaxy* as an example of this, where he try something once, and if it was wrong he either wouldn't do it again, or would try something else. He latter elaborates on this to include not just knowledge about aspects of the game world e.g. about monsters, but also patterns he

picks up and strategies he employs. When asked for an example from the session he just played, he talks about the difficulty he had finding the Flame plant. It might have taken him a while to find it, but he now knew what to do. In relation to learning in other games, he also talked about his experiences in *World of Warcraft.* He considers the learning curve for *WoW* to be higher than for *Super Mario Galaxy,* in part because it is a much bigger and more complex world. While there are a lot of experienced players already within the game who do offer assistance, they don't always want to help out novices, especially with the basics. Instead he found himself seeking help from outside the game world to find things out e.g. through online documentation.

2) Involvement

With respect to player involvement, A took this to be a reference to "how engaged they are with the game". He used *Wii Sports* as an example of a game that is fun and simple but more about socialising with your friends. In contrast, he found *Super Mario Galaxy* more engaging as the player is in complete control of their character and has to respond quickly to the environment. It is a game where you need to "keep your eye on things" and so it draws you in. A saw involvement as being enthralled with the game, and having to interact with it as much as possible. When asked for an example from the session, he used talked about the sense of achievement he experienced when the boss fight was over. Being "emotionally invested" in his success made the experience more involving. With respect to games like *WoW*, he suggested that their size and complexity, allow you to "do so much in it" and so make it more involving than *Super Mario Galaxy* where choices seem more limited.

3) Relationship between player involvement and learning

A seemed convinced there is a relationship between the two concepts, suggesting that it is easier to learn if you are involved in the process. However, he didn't think that involvement was necessary for learning. For instance, there is "ambient learning" that occurs in some games where you pick them up along the way; as opposed having to learn by trying things out. Personally, he suggested that when he is enjoying something he will learn more. If he is frustrated by something he feels he learns less as he is "so involved in being frustrated" that he can't be learning. However, he went on to suggest that "If

I'm frustrated it means I'm getting involved" though there were situations where something was so frustrating he felt like giving up on it. For instance, in *Super Mario Galaxy* there are levels where you have to steer you character around a course of some sort. He felt his input wasn't directly related to the characters actions and got frustrated by this lack of apparent control. To sum he says "If I was entirely ambivalent about playing, I couldn't be bothered, then I probably wouldn't be learning all that much."

Appendix N: Case study 1

Questionnaire

B is a 52 year old staff member of the Open University who I had not met prior to the gaming session. She started playing video game after the age of 18 and plays them several times a week. Gaming sessions during the week and at the weekend last approximately an hour. She likes to play adventure and puzzle games, in addition to *Wii Fit.*

Game chosen

Wii Fit is an exercise game developed by Nintendo designed to make keeping fit fun. The player can engage in four categories of training activities; yoga, aerobics, strength training and balance games, that require the player to use the balance board peripheral. The balance board is also used to carry out a body test (which measures the player's centre of gravity, weight and BMI, and body control to give them a Wii Fit age) and saves all this data to your Mii (a customisable avatar that is intended to capture the player's likeness). The game includes a calendar, graphs, and activity logs to help chart fitness progress. *Wii Fit* was released in the UK in April 2007 and its popularity is indicated by the fact that, at the time of writing, certain suppliers (e.g. Amazon.co.uk, Woolworths) are still sold out of the game, or are selling it for well over the suggested £69.99 retail price.

Synopsis of game play

B brought in her saved game data which was loaded successfully onto the Wii console, so she could access any tasks she had unlocked. Unfortunately, Miis are saved onto the player's Wiimote (as opposed to with the rest of the saved game file) and so though her data was accurate, she did not have access to her personal Mii, or the Miis of family and friends who also make appearances in parts of the game. B decided she did not feel comfortable carrying out the body test so went straight into the training exercises. She was encouraged to engage in her normal routine, so B started with some aerobics; she did the Step class twice and then the Hula Hoop exercise. She then went on play some balance games; Table Tilt (x2), Penguin Slide, Ski Slalom (x2), and Balance Bubble (x3). P concluded the session with another aerobic exercise, the Rhythm boxing class.

Critical episodes/themes

1) Miis – identification and the importance of sharing

One of the first things that came up during the session was the fact that her own Mii and those of her family and friends were not part of the saved game file. This not only meant that her avatar did not resemble her, but that the Miis of her family who use *Wii Fit* were not present and neither were all the other Miis her son had added to the game to represent other family members and friends. For instance, during the aerobics class the player assumes a first person view, with a line of Miis in front of her. As soon as B saw the other characters she said "You see, I don't know these people". After her first attempt and during the interview, B was keen to point out that not only did these other Miis not look familiar but they did not turn round and smile at her after she completed a certain number of "Perfect" steps. *Wii Fit* seems to try and encourage a sense of shared involvement by including the other Miis in exercises when the player's they refer to are not even there. B stated that this time it "far more individual" and it is reasonable to assume that this was due to a lack of familiarity and the lack of encouragement received from these "strangers".

A further extension of this shared involvement has to do with *Wii Fit's* ranking system, thus tying it in with performative involvement. After every exercise is completed, the player is presented with a score, and a star rating which indicates how well they have completed the task e.g. in the Aerobics class this is based on the number of correct steps achieved and how accurately times they were. In addition, *Wii Fit* also ranks the player along with all the other players who have attempted this task, so that they can compare their performance with other family members and friends. It could be argued that at least part of the reason P tried some of the exercise more than once.

The Mii issue crept up again in the Hula Hoop task, and the Table Tilt balance game. In the former, B mentions that she sometimes gets annoyed with the Miis (who again usually represent people she knows) throwing the hoops at her which she is supposed to catch (by leaning to one direction whilst on the balance board. With respect to the latter, the balls she is supposed to navigate into different holes by tilting the virtual board (again through leaning on the balance board) have the faces of other

Miis on them. B states that she calls the balls by the name of the person they represent and goes on to say that "you actually engage with who it is, it's sort of like your mum who is being awkward and not going in". It seems it is during to the Table Tilt game that B achieves the greatest sense of incorporation during the session, though presumably, due to the Mii issue, there was less shared involvement in this case. The activity required a combination of concentration and subtle control (where the performative and tactical frames are closely aligned). B is familiar with how she needs to interact with the balance board to achieve this (through having incorporated the performative and spatial frames) though arguably there is some room for improvement as she has not completed all the levels within this game. Meanwhile the music playing and the presence of a countdown contribute to a sense of tension (affective involvement).

B also made a point of the fact she did not look like the Mii she had been appointed in the game. This occurred at the start of the game but also in the Penguin Slide when she mentioned that she looks quite funny in a penguin suit. This is likely to limit her sense of agency, in the sense that she could be less likely to interpret the events of the game as having occurred to her (as opposed to her avatar), which in turn could affect her sense of performative involvement.

2) Controller issues

Performative and spatial involvement were also affected by a technical issue during the Rhythm boxing class. At the start of the class, the game did not seem to respond to B's actions. As she punched with the Wiimote, the punches did not register on the screen. This frustrated her but she persevered and after checking the connection between the nun-chuck and Wiimote her performance seemed to improve. However, she remained disappointed with her performance overall and stated that she knows she can do better (performative and narrative involvement). When she normally carries out the exercise, she gets more double points (the player's score is doubled if the hit the target at exactly the right time). The game indicates this has occurred with a louder punching sound and bigger target indicator, thus influencing the affective frame and giving the player an indicator of their performance making for a more satisfying experience. The fact that this happened less than usual during the session seems to have contributed to B's overall dissatisfaction with the class.

Conclusions

There does not seem to be much evidence of learning in this case, possibly due to the fact that B chose to carry out her normal routine instead of trying out exercises that were unfamiliar to her. However, it is evident that B has learnt how to carry out these exercises and so it seems she has incorporated enough knowledge to achieve a certain level of competence within the tasks. It could be argued that because *Wii Fit* is about fitness, the focus is on getting players to carry out tasks repeatedly.

What is interesting in this case, is that a lot of information came from something going wrong with the set up – if things had gone right with the Miis, would it have seemed such an important issue?

The DGEM does seem to allow us to talk about the player's movements both on and off-screen. In this case, there seemed to be quite a lot of emphasis on the shared frame even though B carried out the tasks as a single player.

Conceptions

1) Learning

B states that learning is about discovering new things, finding things out and understanding things better. From Wii Fit specifically, she felt that the body test gives players a lot of information. For instance, on top of health and diet tips, the diary section provides a large amount of data that can be used to explain your fitness progress. B felt that this has enabled her to learn more about her own behaviour e.g. fluctuations in weight being due to identified instances of over eating and drinking. She identified this sort of learning as being on the more formal side of things, but also suggested the game allows you to pick and practice certain skills. For example, she feels she has managed to improve her on centre of gravity as a result of the exercises she's done. The fact that the game provides you with a visual representation of this, was seen as being very helpful. In general, her conception of learning seems to fit in with

2) Involvement

What asked what she thoughts player involvement means, B equated the concept with engagement. She went on to talk about how this can be instantiated in different ways, specifically in relation to social engagement. For instance, she mentioned playing *Wii Chess* with other opponents, and suggested that online features might allow for further engagement. In reference to *Wii Fit* specifically, she suggested that when you are engaged with the game, you are involved and immersed it. At the start of the session, B admitted she felt a little awkward but as time went on she relaxed and realised that she was behaving as she normally would. This explanation of her behaviour and feelings, suggests that at first the lab set up made her feel self conscious but that as time went on she felt more comfortable and also more engaged in the game play.

3) Relationship between player involvement and learning

In response to being asked whether she thought there was a relationship between the concept of learning and of involvement, B responded that she didn't' think involvement was necessary for learning to occur. She suggested that it can be but doesn't have to be. Her "gut instinct" told her that involvement probably had more to do with learner satisfaction than learning itself. With respect to games specifically, she assumed that this sense of satisfaction would have something to do with the game responding to player's actions. In this sense, *Wii Fit* was seen as being a good example because it responds to the player by unlocking further challenges as they progress. In addition, the game seems to support this by allowing the player to create their own circle of cyber friends in the form of Miis.

Appendix O: Case study 2

Questionnaire

C is a 31 member of staff at the OU campus who is also an acquaintance of mine from the department. He started playing games between the ages of 11 and 13 and plays them several times a week. During the week sessions last about 2 hours, with this rising to three at the weekends. He plays action, adventure, puzzle, role playing, racing, and strategy games.

Choice of game

Boom Blox is a puzzle game developed by EA in conjunction with Steven Spielberg. The game play revolves around the player using the Wiimote to throw at, grab or blast various configurations of blocks in order to solve series of physics-based puzzles. The game allows for both single and multi-player play, where single players have the choice between Explore and Adventure mode. In Explore, the player learns the mechanics of the game by going the through various puzzle types in sequence, while their success is measured with gold, silver and bronze medals, or a 'nice try' if they fail. The puzzle involve either knocking over block structures within a certain number of throws, or having to carefully grab and pull out a certain number of blocks (similar to Jenga) without causing the structure to topple. In Adventure mode players are presented with a story and scenarios involving the block shaped characters in the game, normally involving defending their own forts (and gems) or attacking the enemy army (for gems) by throwing balls at them.

Synopsis of game play

C accessed his profile and saved avatar ("Tatty", a beaver) and spent some exploring the options. He chose to engage in the Adventure mode, something he had not tried previously but had watched his partner play. He selected the Gem Kingdom, then Sneaky Thieves, then Final Siege where his Sheep army has to defend against the invading Bears (silver medal). After passing this level he unlocked Warriors and went on to select Fight Back, where his Sheep now attack the Monkeys (gold). He goes on to the second stage, Collateral (bronze). He plays this twice, and then goes on to the third and fourth stages, Bluster (bronze) and Iron Gates, but he fails the latter and then decides to return to the Explore mode. Here he selects Grab Tool, then Simple Push. He fails the first time, but succeeds the

second (bronze). After this he goes back to the Grab Tool menu and selects Pinching. He fails the first time, and tries it two more times (bronze, then silver). After this, he returns to the Grab menu and selects High Horse. C attempts this task six times but never manages to gain enough points to complete it (maximum points achieved were 16). Afterwards, he goes back to the Explore menu and chooses Chemical Blocks, He plays Kick Stand (silver), and then plays Reaction which he tries and fails twice before the session is up.

Critical episodes and themes

1) Adventure Mode

C chose to start the session by playing adventure mode. Now while he had played Boom Blox before and was familiar with the basic operations and controls, it was clear from the beginning he was less familiar with this mode. First off, he spent quite a while looking at the various options, and stated later that he could not remember where to find the one he was looking for. During the interview, C also talked about how there were points during this part of the session where he tried to change his point of view but was unable to. Here we have evidence of something that has previously been incorporated on a spatial and tactical level (from playing the Explore mode where the player is able to do this) but that cannot be implemented on a performative level in this part of the game. In combination with the close alignment of the tactical and performative frames – C has little time to react to each task as he needs to rush to protect his Sheep army whilst also figuring out the most effective way to attack the enemy forts – it does not seem surprising that C's affective involvement was quite and he did not find this mode as enjoyable as other parts of the game. In the final level he attempt, Iron Gates, C's Sheep all die before he can work out what to do, which results in him quitting the level and trying something in Explore mode. Arguably, the frustration of not being able to move the camera (spatial and performative), of not having enough time to work out a strategy (tactical), and of losing his sheep (affective and shared) seriously affect his motivation to keep playing. Though he admits to finding the cut scenes prior to each level "cute", he also says he does not actually pay that much attention to them and so the narrative involvement experienced does not contribute much to a sense of incorporation either.

2) High Horse Task

On of the levels C attempted several times, was the High Horse task (in Grab Tool, Explore Mode). In this level he has to gain a certain number of points to succeed, which he gets from removing blocks from the structure before causing the grey block on the top to fall off (see Figure x). He loses a point for any blocks he accidentally knocks off. In total, he tried this six times but he never managed to complete the level. The fact that he kept trying can be seen as evidence of his involvement with this task, plus he also stated he got "really into this one during the interview" and was "very focused" on it. His attempts illustrate the process of incorporation as he is essentially internalising the knowledge that he gains from each frame, specifically the spatial (as he familiarises himself with the structure of the blocks and tries out different camera views), tactical (as he tries to figure out which strategy to adopt) and performative (as he pulls at the blocks and actualises the tactical phase). In terms of strategy, he first started pulling blocks from the bottom of the structure but soon realised the vertical blocks in the middle were going to cause him trouble if he kept trying this. Next, he started pulling blocks from the top. Later he starts to grab at any falling blocks before they hit the ground to avoid losing extra points, and finally he starts to count the remaining blocks in the stack to work out how many points he can get without touching the trickier vertical blocks. While C states he found this more engaging than the adventure mode level, he did eventually get frustrated with it and decided to try something else instead. Earlier on in the task he talks about how he felt like his heart felt like it was in his mouth at certain points e.g. when blocks seem to bounce back, but his affective involvement gradually turned into frustration with later attempts as his strategies were not effective enough. His actions repeatedly failed to lead to the results he wanted i.e. the tactical phase failed to actualise within the performative frame how he expected. It could be argued that as a result, C lost any sense of incorporation he may have had since each failure made his actions feel less and less meaningful. It is interesting to note though, that while he did give up on the exercise, during the interview C still seemed to be engaged the tactical phase (though on a macro level) as he seemed to be considering what he would do next time he approached the task.

Conclusions

Boom Blox seems to engage on certain levels more than others, for instance the narrative, shared and affective seem less influential than the spatial, tactical and performative. This could well be a reflection of the fact it is a puzzle game, though it is worth noting that a failure to work out the puzzles effectively does seem to affect the affective involvement of the player in the sense that it leads to frustration. The DGEM seems to allow us to talk about negative as well as positive forms of involvement.

Again, learning (when seen as internalising knowledge) seems necessary for involvement rather than the other way around.

Conceptions

1) Learning

C suggests that learning involves factual information and remembering it, through experience e.g. "try, fail, try, fail, succeed". He sees his attempts to beat the levels in *Boom Blox* as a good example of this in the sense that he tried things out, in an attempt to learn facts along the way. He uses the term "facts" in relation to answering questions such as "what can I do better to achieve my goal". With respect to other games he's played, C refers to real-time strategy games such as *Command and Conquer*. In this case the focus is on building a base, defending it and probing the opposition. He describes how you can learn from sending out a small troop to investigate the enemies resources, knowing full well that they will die in the process. Nevertheless, he suggests that a lot can be learnt from this, and that he will adapt his strategies based on this knowledge.

2) Involvement

With respect to player involvement, C distinguishes between physical, active involvement and immersive involvement. Games like *Wii Fit* and *Boom Blox*, are examples he gives of the former, while he refers to first-person shooters (FPSs) as examples of the latter. Personally, he states that he prefers the latter because he wants something where "I'm in the adventure, sound is all around, I am in

the environment". *Bioshock* is given as an example of this experience, as it was a game he found completely immersive and could be sucked in to playing for hours on end. In contrast, *Boom Blox,* does not provide any immersive feelings at all for him. He went on to say that he does feel involved in the game when he is trying to solve a puzzle but that the physical reaction is "neither here nor there actually", except perhaps in relation to the grabbing tasks as these require more precise movements. C mentions that the mechanics do not always work as well as they should, so this might contribute to why he feels less involved in *Boom Blox*

3) Relationship between player involvement and learning

C stated that he did think there was a relationship between the two. For instance, when he is playing a FPS, there is a lot of activity going on that he needs to pay attention to but it's "not just paying attention though, it's trying to work out what their tactics might be). He also suggested that this sort of thing can transfer outside of the game e.g. when driving a car. He personally feels his peripheral awareness whilst driving has been improved by playing games. With respect to the physical involvement, he seemed less sure of how it related to learning because he has less experience with these sorts of games. However, C did suggest that with tasks that require more of a delicate response, such as grabbing in *Boom Blox* or golf in *Wii Sports*, there is more potential for transfer as these are quite similar to real world activities.

Appendix P: Case study 3

Questionnaire

D is a 30 year old staff member at the Open University who I had not met prior to the session. He started playing games between the ages of 5 and 7 and plays them several times a week. Gaming sessions last about hour both during the week and at the weekends. In general, he plays puzzle games and rhythm games, like Guitar Hero.

Choice of game

Guitar Hero III is the latest in the popular series of music video games that uses a guitar-shaped peripheral to simulate the playing of rock music, represented on-screen by coloured notes that correspond to the fret buttons on the controller (see Figure x below a picture of the Wii controller) which are presented to the player as a first-person view. Notes can be sustained by holding down the appropriate fret buttons for the time indicated, while chords require more than one fret to be held down at once. Hammer ons and pull offs can also be achieved, and indeed are required within the more difficult levels. There is also a whammy bar which can be used to gain extra points. Player's performance is measured by rock metre (if this drops too low the player will fail the song), a score metre (which contributes to the star rating the player receives at the end of the song – the player can receive up to five stars at the end of the song) and multiplier (which multiplies the points the player gets based on their accuracy). If the player manages to hit all the notes within special sections of notes, illustrated with a star shape around the normal note, the blue bars above the rock metre light up informing the player they know have "Star power". To activate this, therefore doubling the multiplier and reducing the penalty for missing notes, the player must tilt the guitar controller. The game supports four modes of difficulty; easy (which requires the use of three fret buttons), medium (which requires the use of four) hard (which requires the use of all five fret buttons) and expert (which increases the number of notes and general difficulty). It also supports individual play through a career mode, as well as cooperative and competitive modes for two players.

Synopsis of game play

D brought in an SD card of his game progress but unfortunately the file seemed to be corrupt. He decided to play through the first level of the game, so he could gain enough money to buy some new songs from the shop, in order to try something during the session that he hadn't played before. He chose the medium difficulty level, and the character Axel Steel as his avatar. D first played "Slow Ride" by Foghat (four stars), then "Talk Dirty to me" by Poison (four stars), then "Hit me with your Best Shot" by Pat Benatar (four stars), finishing the first level with Kiss's "Rock n' Roll All Night" (five stars) for the encore. At this point he decided he would be able to purchase some songs from the shop. He chose to play "Go That Far" by Bret Michaels (three stars) and then "Heir kommt Alex" by Die Toten Hosen (three stars). After this, he still had some time left so was told he could play whatever he liked. He chose to play "Hit me with your Best Shot" again (four stars) and finished the session with "Sunshine of your Life" by Cream (five stars).

Critical episodes and themes

1) Star ratings

It became evident that one of D's main motivations for playing *Guitar Hero* was to achieve a five star rating for each of the songs he played (part of the longer term performative frame). While he mentioned this explicitly during the interview it was also suggested by his decision to play "Hit me with your best shot" again. In the interview he talked about how he had hoped he would achieve a five star rating for each of the earlier songs (from the first round) and seemed disappointed that he had not been able to do so. It seems he has achieved this rating for the same songs in the past (which can be seen as part of his personal narrative) and ideally would like to get five gold stars for each of them (which is an almost perfect score). When he played "Go that far" and "Heir kommt Alex", songs he had not played before and was less familiar with, he did not enjoy them as much and suggested that you enjoy songs more once you've played them a couple of times and have gotten more of "a feel" for it. D explains that it is for this reason, after trying the new songs he decided to try "Hit me with your best shot" again. When he failed to achieve five stars in this, he went on to a second level song "Sunshine of your love" which he used to play bass for. This meant he was very familiar with the

song, and this time he did achieve five stars after completing it. It could be argued that D's affective involvement of learning new songs is reduced by his need to pay conscious attention to the performative and affective aspects (learning the new pattern, listening to the song) and so once he internalises this knowledge he reaches a greater degree of involvement.

It is worth noting however that D assumed the star rating is totally dependent on hitting as many notes as possible. His assessment of the performative frame means that he makes the tactical decision to ignore his score, the multiplier and the rock metre. The game itself does not make it clear how to improve your rating but it seems the two possibilities are too hit as many notes as possible, and/or to improve your score by increasing the multiplier and using star power at specific intervals.

2) Strategies employed

Another tactical decision D makes regards his use of star power. During the gaming session, there were several occasions where he had achieved star power but he did not activate it. For instance, during "Talk dirty to me" though he achieves star power early on, he only uses it at the end of the song. When this point was raised during the interview D stated that he is aware of when his star power bar is full but chooses not to use it. This decision is based on something he read in a wiki about Guitar Hero which suggested that players should hold on to it until they reach a difficult section in the song, the reason being that if you miss notes while in star power mode it will not affect your star rating (or at least not as much as if you did not use it). As D does not pay attention to his score or the multiplier, he was also unaware that activating star power doubles the multiplier (and thus adds to your score). Basically, he has failed to incorporate this bit of tactical information but because his performance has never fallen below three stars he continues to use the same strategy, and enjoy the game.

There is a very close alignment between the tactical and performative frames in *Guitar Hero III* which is perhaps why the game seems to demand the player's full concentration, especially for less familiar songs that require further internalisation. The affective frame is also hugely important, as the music is integral to the game play. In addition, the game makes a noticeable jarring noise when the player misses a note to signal this has occurred. D stated that while he pays attention to the notes coming up ahead, he actually tried to listen for when he should press the appropriate fret buttons as he does not

find the timing of the game (in terms of when the visual interpretation of the notes should be pressed) to be accurate. There is no way to corroborate whether this is the strategy he is indeed using in this case, but it is interesting to note the strategy he employed when he missed larger sections of notes. For instance, during "Go that far" he missed sequences of notes in a row during a certain pattern of yellow and green notes. He missed enough notes for his rock metre to go into the red (which would mean the crowd would boo him off the stage). However, he managed to improve enough to avoid this, and he became more successful at the pattern he was having difficulty with. When questioned about this during the interview, he described how he was trying to get a feel for the rhythm of the song and so kept waiting for a new bar in order to "jump back in". While he looked to bottom of the screen for guidance, he found it disconcerting as there seemed to be a mismatch between what he was hearing and when the game was telling him to press the notes. Essentially there was a mismatch between the information between the performative and affective frames so he chose to focus on the affective. This mismatch could be seen as another reason as to why he seemed to enjoy these unfamiliar songs less.

Conclusions

Again involvement seems dependent on learning. Players have to have internalised enough in order to feel deeper levels of involvement, and in fact one of D's motivations for playing *Guitar Hero III* is to experience this in terms of flow. While on the surface, the spatial frame seems less influential in a game like this (as there is no virtual world to explore), the close alignment between the physical actions the player carries out with the guitar controller and how they are interpreted in the game world (via their avatar) seem to allow for a different sense of spatial (physical) involvement. This allowing for a greater sense of incorporation when the player is performing successfully.

Conceptions

1) Learning

D initially found this a weird question but responded that he thought learning in general was "a combination of acquiring knowledge and techniques", and with respect to games like Guitar Hero, this

more orientated towards techniques. He suggested that some games are a bit "knowledge heavier" for instance, older adventure games which require the player to remember where things are, explore what items are for, deal with clues from other characters etc. He referred to this as "knowledge of a kind", but assumed that when people are discussing learning they are usually referring to something more "objective" and less context-specific. With respect to Guitar Hero itself, he thinks it helps people with hand-to-eye coordination and with learning to independently control their fingers. D though this could be a transferable skill, but for himself he had already learnt to do this through his own bass guitar playing experience. In this case, Guitar Hero was more about practicing these skills than learning them in the first place. With respect to other games, D thought that players can often learn about principles even if they don't try them out in practice e.g. racing games and drifting. He also referred to games such as Asteroids as being the first time he ever really though about physics related concepts through learning how to manipulate things within that environment.

2) Involvement

D stated that player involvement was something that occurred when you are "are engaged enough, that you forget that you're, playing a game in a certain physical situation, you forget the context and are completely concentrated and engaged on what you're doing". He stated that Guitar Hero can provide this experience, and when it does it's at its best, before going on to suggest that this is part of the reason why he plays the game during his work day. Effectively, it allows him to "switch off" for twenty minutes. He said that he had experience this within other games, but perhaps not to the same degree as his brothers when they play games like Sim City. In this case, they are so concentrated they spend hours playing and forget about everything else.

3) Relationship between player involvement and learning

When asked about whether he thought there was a relationship between involvement and learning D paused and reconsidered his definition of involvement. He considered a more general definition of involvement, where it is seen as an indication of caring about what you are doing, would suggest the player is more likely to see learning as necessary (whether the learning refers to knowledge or

technique). In fact, he suggested that "if you are engaged in a looser way you are much more likely to be motivated to learn something". With respect to the definition he originally gave however, he was less sure about the relationship. He thought that such a deep level of involvement and the ability to dissociate to such an extent could not be experienced without having learnt the basics in the first place.

Appendix Q: Case study 4

Questionnaire

E is a 34 year old postgraduate student at the Open University and a friend of mine who I have played video games with. He began playing digital games between the ages of 8-10, and plays them daily. During the week sessions last about an hour, while at the weekend this extends to 3 hours. He likes to play action, puzzle, racing, strategy and rhythm games.

Choice of game

Initially E requested to play *Guitar Hero III* (see Case 3 for description). However, due to technical difficulties he switched to *Boom Blox*, (see Case 2 for description) which he had also played recently.

Synopsis of play

As E had not brought in any saved data to play the game he used a previously existing profile, so that he could access unlocked tasks. He chose to stay in Explore Mode throughout the session, and began with the Gem Blox task. He succeeds in Warriors (gold) and Teeter Totter (gold), before quitting these levels and playing Bomb Blox in order to attempt something he had not played before. He plays the following levels: Minefield (gold), Bomb Barn (quits, gold), Bomb Push (gold), Bomb Cascade (gold), Sliding Bomb (silver), Flying bombs (nice try, gold), More Flying Bombs (x 5 nice tries, gold) and Bomb Push 2 (gold). Though he did not complete all the tasks in this category, he decides to try the Chemical Blox levels instead. Here he plays Beakers (quits, bronze, quits), Momentum (gold), Chem Towers (gold), Green Punch (bronze, silver), Chemical Jug (quits, quits, quits), Kick Stand (quits, quits, nice try) and finished the session with Reaction (gold).

Critical instances and themes

1) Instructions or clues?

One of the issues that reoccurred was the fact that E found the instructions were more like clues than instructions. He found them "kind of coy" and so they were not always as helpful as they could have been. As a reaction to this, he found himself trying to memorise what they said so he could go over

them again during the actual task. The instructions give information to the player about what to pay attention to during the task, and so they are essentially part of the tactical involvement frame. In some instances, they were helpful in actualising the tactical phase within the performative fame. For example during the Sliding Bomb task the instructions stated "Blast down a ramp for the big Bomb Block to slide on! Once it starts moving, you're golden!" and so he realised he needed to create a ramp to successfully complete the level. Further, when reviewing the Chem Towers task, E pointed out that the instructions – "Bring the two Chemical blox together for explosive results! Aim low to do it in one throw!" – primed him to aim lower when he threw at one of the structures, and thus he performed the task effectively. However, there were occasions when E did not find the instructions helpful. When he started the Beakers task he could not figure out a strategy, so actually restarted the level so he could re-read the instructions. At the start of the Beakers task he is told "Drop the Chemical Blox into each other to start a chain reaction and clear all the Gem Blox in just one throw!" but he cannot figure out a strategy to do so in one throw. Essentially, he cannot actualise a tactical strategy that relates to how the task is set up spatially and that would allow him to succeed in the performative. Similarly, in Kick Stand, the instruction – "Kill two birds with one stone to get the Gold in this level" – annoyed him because he could not see how the spatial and tactical frames interrelated for him to be able to get all the gems in one throw. It could also be argued that he gets frustrated when the instructions only tell him that he can succeed in one throw without suggesting exactly how this could be done. In this sort of instance, there is too much of a divide between the tactical and performative frames for the player and this results in a sense of frustration, as the player doe not know how to bridge this gap.

2) Cause and effect breakdowns

Another issue that came up and contributed to E's reduced engagement by the end of the session had to do with the fact that his actions did not always lead to the results he expects. There were several tasks he attempted more than once, but his frustration is most evident with the last two levels. In Kick Stand, he was already annoyed by the ambiguous instructions and how he could not relate the spatial, tactical and performative frames. He ended up throwing at the "table leg" supporting one of the structures as it looked like it might lead to a chain reaction of some sort. It did, but more explosions occurred than he expected but as he could not understand why he was dissatisfied with his

performance. He grew more frustrated with the layout of the task, as he was unable to figure out whether he needed to use all the blocks that had been provided. Basically, E was unable to internalise the tactical and performative frames and his affective involvement with game was rapidly decreasing, as evidenced by him quitting the level twice before completing it with a simple strategy that only gets him a "Nice try".

Further evidence of his declining affective involvement is provided by the statement that he was "exasperated" by this point and relieved to hear was only a few minutes left of the gaming session. In this state, he attempted the Reaction task. While he considered a strategy and implemented it by knocking out five of the six towers, he was disappointed that he did not get all six. Essentially, the tactical phase did not actualise the way he expected and he had to throw again to complete the task. However, he still received a gold medal and at this point he realised that he could not have gotten all the towers in one throw. Arguably, his declining affective involvement meant he did not pay attention to the instructions at the start, which would have told him he needed two throws for the gold medal, resulting in a failure to internalise some tactical knowledge and reducing his sense of involvement. E blames the designers for this interruption within the performative frame, as he reckons it is less satisfying to complete the task in two throws. Finally, it is clear his affective involvement is completely diminished by this point when I ask him whether he wants to play another round and he immediately says "No".

Conclusions

The DGEM helps to illustrate the connection between the information provided in the game, how this can both aid and hinder learning and how this in turn influences player enjoyment. When the instructions gave the player some idea about what tactics to try, they did help lead to success but because they were sometimes ambiguous and failed to help the player develop a strategy within the tactical frame, they were interpreted negatively within the affective frame. It is also interesting to note that success seemed to be defined by achieving gold (a performative motivator) rather than passing the level with silver or bronze. In addition, frustration occurred when the player could not work out how the spatial, tactical and performative frames were supposed to come together. Even when success was achieved it was not satisfying because he couldn't understand why it occurred. This implies

internalisation did not occur successfully, and so neither did internalisation. The expected results were not achieved within the performative frame, making the player's actions seem less meaningful, and so incorporation was unlikely to occur in this case.

Conceptions

1) Learning

E states that learning is about "absorbing and retaining and understanding new information". He goes on to explain that when someone learns something by rote it cannot really be considered learning if they do not understand what it actually means. He does think he has learnt from playing *Boom Blox* in the sense he has learn how to improve his performance within the game. E also points out that while you would not face the same problems in "real life" he feels he has been concentrating and that the game is a "good brain exercise", a bit like doing a crossword. Part of the reason he does not think the learning will transfer outside of the game is to do with the fact that he does not find the game physics very realistic. E goes on to talk about his experiences in other games like *F1* and *Rogue Spear* in a similar way, suggesting that they are more about learning which approaches work than learning what the "right answer" is. He states that just because he plays *F1* does not mean he will be any better at setting up a real Formula 1 car and besides, this is only a small part of the game and the rest requires much less conscious thought. He points out that he enjoys playing something *F1*much more than *Boom Blox* because he got frustrated when the consequences seemed to break down in *Boom Blox.* Not only does *Boom Blox* require a "constant process of thought" which he found tiring but he could not always work out the cause and effect relationship of his actions within the tasks. Nevertheless, this was not always the case and he likes the variety the game provides with respect to the different types of exercises you can play e.g. shooting games, Jenga style exercises and blowing things up.

2) Involvement

E stated that the most plausible definition of involvement for him in this case was "somebody getting absorbed in the game" and that it is when someone is "getting invested in the game, getting like drawn in". He suggested he felt this to a certain extent with respect to *Boom Blox* and could tell he was getting "worked up" about it at some points. When he did succeed in the tasks he found it "mildly

satisfying" but he would get annoyed with the cues the instructions provided as they were not always very obvious. E saw the fact that he was unwilling to complete all the tasks within the categories he tried as evidence that while he was involved in what he was doing he cannot have been that involved. In contrast, when playing games like *Rogue Spear* and *F1* he would have been very reluctant to stop playing in the middle of a level. In these games he is often "thoroughly, thoroughly absorbed" so much so he experiences physical symptoms like "sweaty palms" and tension.

3) Relationship between player involvement and learning

E did state that there would have to be a relationship between the two concepts as if you were not involved then you would not be able to apply yourself and succeed. For instance, you need to pay attention to information in the form of prompts and instructions; if you didn't care then you wouldn't be able to improve your performance. While this is not a relationship he had given much thought to previously, he suggested that you would have to be involved in order to learn from the game. Not only would you have to notice what went wrong but you would have to want to repair it and apply the knowledge you gained from previous levels.